CITY OF WILMINGTON, NORTH CAROLINA

STORMWATER MANAGEMENT PLAN

Prepared by:
Stormwater Services
PO Box 1810
209 Coleman Drive
Wilmington, NC 28412

NPDES Permit No.: NCS000406

Reporting Year: March 1, 2007 – February 29, 2008

REPORTING CERTIFICATION

I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

_____ _____

David B. Mayes, P.E. Date
Manager, Stormwater Services

TABLE OF CONTENTS

INTRODUCTION

STORMWATER MANAGEMENT PLAN OVERVIEW

The North Carolina Division of Water Quality issued NPDES Phase II Permit NCS000406 to the City of Wilmington effective March 1, 2007. The Stormwater Management Plan is the City of Wilmington's program to comply with NPDES Phase II permit NCS000406 for stormwater discharges from Small Municipal Separate Storm Sewer Systems (MS4s). The plan defines strategies and guidelines necessary for protecting water quality and reducing pollutant discharges to the maximum extent practicable. The plan also includes reporting results for the current yearly reporting period from March 1, 2007 to February 29, 2008.

The plan is a guidance document to be used by the City staff and the general public. The plan is evolving and will address needs and priorities that will be reflected in compliance programs and revised ordinances over the 5 year implementation schedule.

As required by EPA regulations for the NPDES Phase II stormwater programs, the following six minimum measures are addressed in the plan:

1. Public Education and Outreach
2. Public Participation and Involvement
3. Illicit Discharge Detection and Elimination
4. Construction Site Runoff Control
5. Post-Construction Runoff Control
6. Pollution Prevention and Good Housekeeping for Municipal Operations

STATUS OF IMPLEMENTATION

The City of Wilmington is pleased to report excellent progress for year 1 compliance with requirements of NPDES Phase II permit NCS000406. Primary areas of work include:

- Preparation for ordinance revisions related to Post Construction and Illicit Discharge BMPs
- Continuation of Public Outreach and Public Participation efforts

Wilmington has been preparing for these requirements since 1998 when City Council approved the formation of a stormwater utility. We have had a public outreach and participation program since then. We have also contracted with UNCW Center for Marine Science for ambient monitoring of water quality on creeks within the City. Therefore, we were already well underway prior to NCDWQ issuing Wilmington's permit.

CHANGES/JUSTIFICATION

1) Proposed Change to Section D: Illicit Discharge Detection and Elimination

Current Requirement – BMP (h) Establish procedures to identify and eliminate failed septic system and sanitary sewer overflows.

Measurable Goal – Establish procedures to identify and report to the County health department failed septic systems located within the permittee's planning jurisdiction. Establish procedures to identify and report sanitary sewer overflows and sewer leaks to the system operator.

Schedule – Year 2

Background/Description: For the past several years, the City of Wilmington and New Hanover County have been working towards the formation of a common entity to operate water and sanitary sewer utilities currently operated by both parties. Currently, Wilmington Public Utilities Department provides potable water within the City limits as well as certain areas outside of City jurisdiction. New Hanover County also has some potable water supply service areas outside of City jurisdiction. The City provides for wastewater collection within the majority of its jurisdiction. New Hanover County supplements wastewater collection primarily in areas annexed by the City in 2000 and 2001. The City provides treatment for both parties' wastewater collection systems at two municipally owned treatment plants. For these reasons as well as customer service, operations and maintenance, the City and County agreed to form the Cape Fear Public Utility Authority (CFPUA). To date, an interlocal agreement has been approved, CFPUA has been formed and has a functioning board, start up funding has been dedicated to CFPUA and numerous key staff members have been hired by CFPUA. Following many months of meetings and preparation by numerous committees, CFPUA is set to become the official operator of the wastewater collection system on July 1, 2008.

Proposed Change: The City of Wilmington requests that procedures to identify and report sanitary sewer overflows and sewer leaks to the system operator be moved from Year 2 to Year 3.

Justification: The formation of CFPUA is a massive and complex undertaking. Because CFPUA is not yet the official operator of the system and we do not know their staff or regulations, we do not believe that between July 1, 2009 and the end of Year 2 is sufficient time to accomplish this task. In addition, CFPUA will not have the same authority that a municipal government has. They will need time to develop their operating procedures by combining what the City and County have done in the past with what are legally capable of doing as an Authority. We are simply asking to provide additional time for us to work with the staff of CFPUA after July 1, 2009 and to properly establish these procedures.

2) Proposed Change to Section F: Post-Construction Site Runoff Controls

Current Requirement –

BMP (a) Establish a Post Construction Stormwater Management Program.

Measurable Goal – Develop and adopt by ordinance (or similar regulatory mechanism) a program to address stormwater runoff from new development and redevelopment. Implement and enforce the program within 24 months of the permit issue date.

Schedule – Year 2

Background/Description: On March 7, 2008, Tom Reeder of NCDWQ notified the City of Wilmington in writing that EMC was in the process of revising the Coastal Stormwater Rules and anticipated them going into effect in August of 2008. Once in effect, they plan to revise our permit to reflect the same standards as required by the new Coastal Stormwater Rules. In addition, the rules could change from their current version prior to approval by the General Assembly. Wilmington started our process of updating our ordinances for post construction requirements within the first 2 months after receiving our Phase II permit. To date, we have invested many staff hours in meetings, research, etc and held one public input meeting. Our current permit states that ordinance revisions for post construction requirements must be in place by March 1, 2009. Approval of the language of the ordinance will have to be done by NCDWQ, local planning commission and City Council.

Proposed Change: The City of Wilmington requests 1 year from the date that NCDWQ amends our permit for the new Coastal Stormwater Rules to bring our ordinances into compliance.

Justification: Based on the facts above and the high level of interest in these rules, we anticipate the need for additional time in order to properly amend our ordinances. City staff anticipates that time will be needed to properly research and draft ordinance language, plan for, receive and amend language based on public input, have NCDWQ approve language and present final versions to local planning commission and City Council for approval. The City of Wilmington has shown commitment towards implementing this program and will pursue changing these rules once they are included in our permit. A 1 year timeframe to accomplish this task is not unreasonable considering all of the tasks listed and accounting for the possibilities of multiple presentations to planning commission or City Council.

CITY OF WILMINGTON STORMWATER SERVICES OVERVIEW

COMPREHENSIVE STORMWATER MANAGEMENT

Comprehensive stormwater management takes into account both the quantity and quality of stormwater runoff and is reflected in five core components of the Wilmington's Stormwater Services program:

MANAGEMENT AND PLANNING

Master planning utilizes the existing stormwater system inventory to develop a long range plan to improve drainage and water quality within an entire watershed. When planning on such a large scale, Stormwater Services seeks involvement and input from citizens and stakeholders. Management activities also include customer service – responding to customer concerns or inquiries and administrative services required for operation of the City stormwater utility.

REGULATORY AND ENFORCEMENT

Future regulatory and enforcement activities include modifying the existing stormwater ordinance requiring comprehensive stormwater management and creating technical standards for design and maintenance of private stormwater facilities. Stormwater Services also provides two semi-annual inspections for privately permitted stormwater retention facilities. These inspections are performed in order to ensure compliance with city maintenance standards. Compliance with NPDES Phase II stormwater regulations also fall into this category.

CAPITAL IMPROVEMENTS

The stormwater utility provides dedicated funding and staff resources for planning, designing, and constructing capital projects. These projects are necessary when the existing storm drainage system is inadequate and can result in flooded streets, houses, and businesses. Capital improvement projects require collaboration among City departments, outside agencies, and citizens in affected areas. Whenever possible, capital projects incorporate innovative design or best management practices (BMPs) to improve water quality and reduce the quantity of stormwater runoff.

OPERATIONS AND MAINTENANCE

The City of Wilmington's Maintenance Division is responsible for maintaining the public drainage system. Maintenance activities consist of open drainage, closed drainage, street sweeping, and best management practices (BMPs). The open drainage system consists of roadside swales, ditches, channels, creeks, and ponds. The closed drainage system consists of pipes, culverts, catch basins, and manholes. Both of these systems are maintained using manual and mechanical techniques to insure that they remain open for proper drainage. Street sweeping provides preventative maintenance to minimize the amount of trash, debris, sediment, and other pollutants entering open or

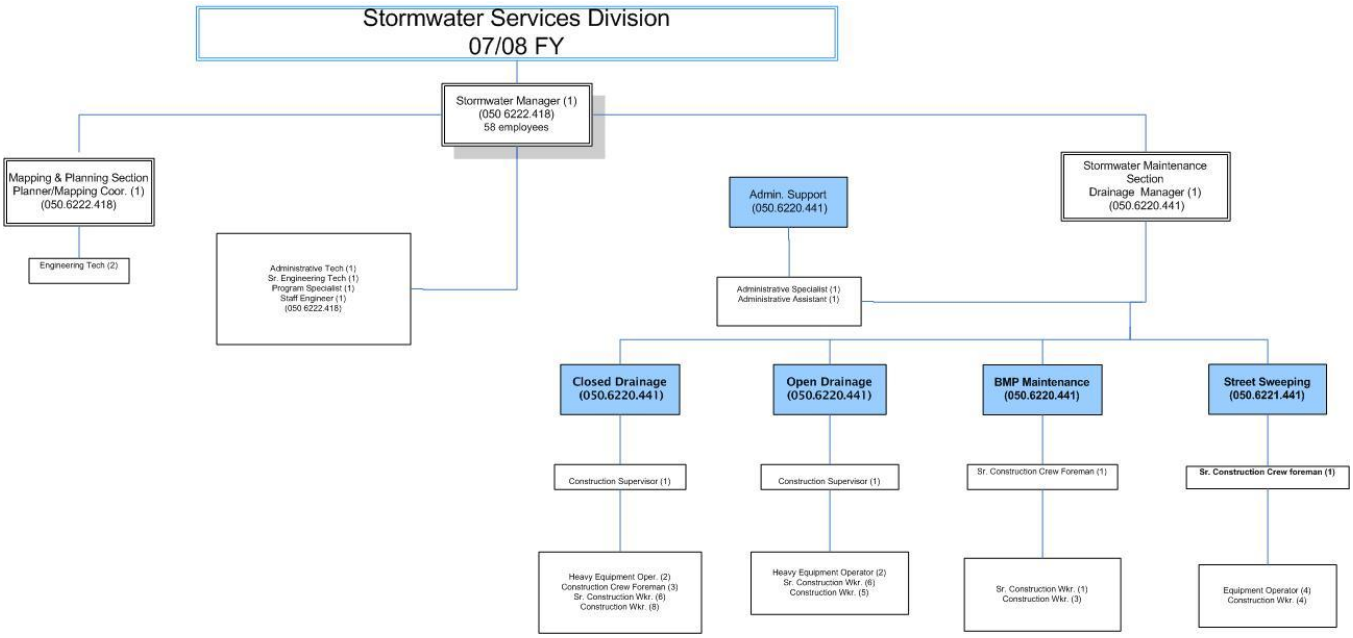
closed drainage routes. BMP maintenance consists of activities necessary to keep over 40 ponds, wetlands, and bio-retention areas in fully-functioning condition.

WATER QUALITY

Water quality monitoring is executed by the University of North Carolina at Wilmington under annual contract with the City. Monitoring is performed on specific creeks and waterways within the City limits. Monitoring tests for specific pollutants and resulting data is used to plan capital improvement projects, guide outreach and education efforts, assess water quality at the sites monitored, identify persistent pollutant discharge areas or points, help to build a framework for future detection and tracing of pollutant sources and obtain grant funding.

MANAGEMENT AND PLANNING

Organization Chart of the Stormwater Services Division



Current FY Budget and Next Year's Anticipated Budget

	Adopted FY 2007-08	Estimated FY 2008-09
REVENUES		
Stormwater Utility Fees	4,787,048	4,954,389
City Streets SW Utility Fees	1,285,156	1,317,285
Special Revenue Fund	-	-
Stormwater Discharge Permits	11,225	12,000
NCDOT Drainage Maintenance	30,000	30,000
Transfer from Payment in Lieu	30,000	30,000
Interest Earnings	150,000	114,000
Miscellaneous	7,000	7,000
Appropriated Fund Balance	-	70,000
TOTAL REVENUES	6,300,429	6,534,674
EXPENDITURES		
Public Services	4,024,657	4,342,401
Non-Departmental	782,225	788,263
Debt Service/Debt Reserve	1,248,547	1,184,010
Contingency	20,000	20,000
Transfer to Cap Projects Fund	225,000	200,000
TOTAL EXPENDITURES	6,300,429	6,534,674
SURPLUS/(SHORTFALL)	-0-	-0-

Note: Estimated Budget for FY 2008-09 has not yet been presented to City Council for approval and is provided in this report in draft form.

REGULATORY AND ENFORCEMENT

Public Services Code Enforcement

The Public Services Department has enforcement authority and issues Notices of Violation for non compliance. As part of the current program, the department receives complaints from the public and the City's Stormwater Maintenance crews pertaining to stormwater issues. Each complaint is investigated; documented and corrective action is implemented. Actions supported by current ordinances such as those regulating willful disposal of yard waste in the stormwater system, and accumulation of litter which may enter the system, can result in enforcement action. Consequently all complaints provide opportunity for educating the public on our city's stormwater issues and the new ordinances that will soon come into effect. See Appendix I

Public Utilities Code Enforcement

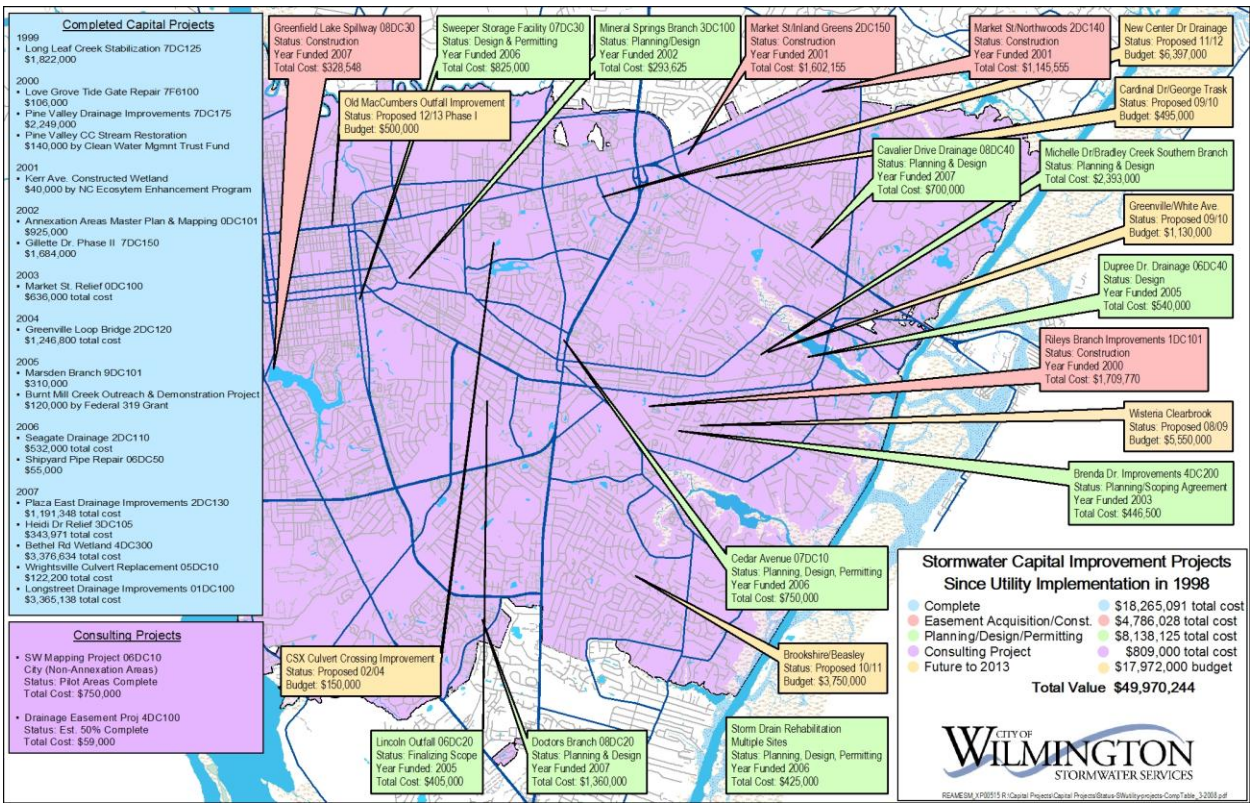
The Public Utilities Department currently employs 4 Environmental Compliance Officers that's duty it is to implement and enforce elements of the City's NPDES Wastewater Discharge Permit, the City's Collection System Permit and their supporting City Ordinances. As part of those requirements the group regulates sanitary sewer overflows and eliminates" any wastewater or other polluted waters from discharging to natural outlets." They also respond to reports and investigate leads generated by the public or monitoring results, as part of their permit requirement. The Public Utility Department however is in transition and beginning July 1, 2008 will become the new Cape Fear Water and Sewer Authority. The ramifications of this change have not yet been fully determined.

Cape Fear Public Utility Authority

As discussed in previous sections of this report, the Cape Fear Public Utility Authority will officially take over as the operator of the public water supply and sanitary sewer collection system on July 1, 2008. Once this occurs, City Stormwater Services staff will begin working with the authority to define the regulatory responsibilities between the two organizations.

CAPITAL IMPROVEMENT PROJECTS

Capital Projects Summary Map



In-House Projects

Location	Descriiption		Total Cost
Mary Bridgers Park	Construct new stormwater wetland		$22,275.99
3600 blk Sutton Dr	Replace existing pipe, build Structure	187 ft pipe	$17,153.88
Kelly Rd	Replace existing pipe, subdrain, Structures	411 ft pipe, 4 basins, 1 junction box	$71,714.76
2200 blk Charles Paine	Replace existing pipe, subdrain, Structures	200 ft pipe, 1 basin	$26,895.46
4800 Blk Maple Ave	Install new pipe, build Structures	66 ft pipe, 2 basins, 1manhole	$16,943.03
100 blk Grainger Point Rd	Replace existing pipe, subdrain,Structures	70 ft pipe, 7' strip drain,	$10,273.27
100 Blk Cavalier Dr	Replace existing pipe	193 ft pipe, 2963 ft ditching, sod, etc	$67,123.53
1000 blk Robert E. Lee Dr	Replace existing pipe, Structures	112 ft pipe, 1 basin	$13,811.13
4000 blk Wrightsville Ave	Install new Structure	1 basin	$4,433.19
4000 blk Wrightsville Ave	Install new pipe, Structures	48 ft pipe, 1 basin	$4,009.57
Small Randall Pond	Install new pipe	56 ft pipe	$1,848.95
600 blk Dogwood Lane	Install new pipe	8 ft pipe	$693.00
4100 blk Abbington Terrace	Install new pipe, Structures	17' pipe, 2 basins	$9,732.78
4100 blk Sunglow Dr	Install new pipe	90 ft subdrain	$8,624.89
100 blk Sandhills Dr	Install new pipe, subdrain, Structures	252 ft subdrain	$10,382.89
00 blk Mercer Ave	Build new Structure	1 basin	$2,503.32
4200 blk Appleton Way	Build new Structure	1 basin	$1,512.23
			$289,931.87

OPERATIONS AND MAINTENANCE

Yearly Maintenance Activities Chart

Activity	Amount	U.O.M.	Labor Hours		Total Cost
INSPECTION					
Inspect culvert	398	each	107.00	$	1,933.15
Inspect curb line	n/a		2245.25	$	59,235.14
Inspect outfalls-ditch	14449	ft.	275.50	$	5,082.62
Inspect pipe lines	n/a		14.00	$	376.94
Inspect ponds	n/a		268.00	$	5,034.50
Inspect structures	15205	each	1749.95	$	41,003.03
Inspect tide gate	n/a		97.75	$	2,808.06
			4757.45	**$**	**115,473.44**
MAINTENANCE					
Drainage					
Clean culvert	264	each	390.00	$	7,782.26
Clean ditch (manual)	309097	ft.	7700.75	$	152,638.79
Clean ditch (mechanical)	10381	ft.	1868.75	$	47,823.67
Clean structure	12316	each	4283.00	$	127,917.15
Clean lines	162540	ft.	3141.00	$	137,953.57
Haul waste material	368	load	521.50	$	15,974.18
Mow ditch/slope	306838	ft.	1328	$	42,173.87
Mechanical rodder	2340	ft.	240.25	$	4,643.62
Tide gate maintenance	n/a		172.00	$	3,117.60
			19645.25	**$**	**540,024.71**
BMP					
Apply chemicals	n/a		467.00	$	19,336.95
Greenfield lake maintenance	n/a		275.50	$	5,219.04
Mow pond	185	each	935.25	$	18,882.72
Pond maintenance	n/a		992.75	$	19,586.96
Randall pond maintenance	n/a		402.50	$	10,809.48
			3073.00	**$**	**73,835.15**
Sweeping					
Sweep street	9240	mi.	5743.75	$	178,922.83
Hand sweeping	9.34	mi.	658.75	$	17,425.28
Haul sweepings	504	load	814.50	$	21,506.16
			7217.00	$	217,854.27
REPAIR					
Cave-in repair	220	each	7058.50	$	203,038.45
Stabilize bank	3467	ft.	552.00	$	25,706.71
Washout repair	24	each	702.00	$	32,839.16
			8312.50	**$**	**261,584.32**

WATER QUALITY

Monitoring Program Overview

In October 1997, the City of Wilmington contracted with the UNCW Center for Marine Science for a project with the goal of assessing water quality in Wilmington City watersheds under base flow conditions. Also, certain sites were analyzed for sediment heavy metals concentrations (EPA Priority Pollutants). New Hanover County also participated in this effort for tidal creeks outside of City jurisdiction. UNCW produced a combined report of results entitled Environmental Quality of Wilmington and New Hanover County Watersheds. Immediately below is an overview of their work methods. Following this overview is the executive summary of their most recent report.

The water quality data in these reports are presented from a watershed perspective. Some of the watersheds cross political boundaries (i.e. parts of the same watershed may lie in the County but not the City). Howe and Whiskey Creeks are examples. Water quality parameters analyzed in the tidal creeks include water temperature, pH, dissolved oxygen, salinity/conductivity, turbidity, nitrate, ammonium, orthophosphate, chlorophyll *a*, and in selected creeks fecal coliform bacteria. Similar analyses were carried out in the City watersheds with the addition of total Kjeldahl nitrogen (TKN), total nitrogen (TN), total phosphorus (TP), total suspended solids (TSS) and biochemical oxygen demand (BOD) at selected sites.

Water Quality Methods

Field parameters were measured at each site using a YSI 6920 Multiparameter Water Quality Probe (sonde) linked to a YSI 650 MDS display unit. Individual probes within the instruments measured water temperature, pH, dissolved oxygen, turbidity, salinity, and conductivity. YSI Model 85 and 55 dissolved oxygen meters were also used on occasion. The instruments were calibrated prior to each sampling trip to ensure accurate measurements. The UNCW Aquatic Ecology laboratory is State-Certified for field measurements (temperature, conductivity, dissolved oxygen and pH) and for laboratory chlorophyll *a* measurements. The light attenuation coefficient $\underline{k}$ was determined (at locations where depth permitted), from data collected on site using vertical profiles obtained by a Li-Cor LI-1000 integrator interfaced with a Li-Cor LI-193S spherical quantum sensor.

For the six tidal creeks, water samples were collected monthly, at or near high tide. For nitrate+nitrite (hereafter referred to as nitrate) and orthophosphate assessment, three replicate acid-washed 125 mL bottles were placed ca. 10 cm below the surface, filled, capped, and stored on ice until processing. In the laboratory the triplicate samples were filtered simultaneously through 25 mm Millipore AP40 glass fiber filters (nominal pore size 1.0 micrometer) using a manifold with three funnels. The pooled filtrate was stored frozen until analysis. Nitrate+nitrite and orthophosphate were analyzed using a Bran-Luebbe AutoAnalyzer following EPA protocols. Samples for ammonium were collected in duplicate, field-preserved with phenol, stored on ice, and analyzed in the laboratory according to the methods of Parsons

et al. (1984). Fecal coliform samples were collected by filling pre-autoclaved containers ca. 10 cm below the surface, facing into the stream. Samples were stored on ice until processing (< 6 hr). Fecal coliform concentrations were determined using a membrane filtration (mFC) method (APHA 1995). North Carolina water quality standards are also included in the report.

The analytical method used to measure chlorophyll *a* is described in Welschmeyer (1994) and US EPA (1997). Chlorophyll *a* concentrations were determined from the 1.0 micrometer glass fiber filters used for filtering samples for nitrate+nitrite and orthophosphate analyses. All filters were wrapped individually in aluminum foil, placed in an airtight container and stored in a freezer. During the analytical process, the glass filters were separately immersed in 10 ml of a 90% acetone solution. The acetone was allowed to extract the chlorophyll from the material for 18-24 hours. The solution containing the extracted chlorophyll was then analyzed for chlorophyll *a* concentration using a Turner AU-10 fluorometer. This method uses an optimal combination of excitation and emission bandwidths that reduces errors in the acidification technique.

Samples were collected on six occasions within the Wilmington City watersheds from January through September 2006. Field measurements were taken as indicated above. Nutrients (nitrate, ammonium, total Kjeldahl nitrogen, total nitrogen, orthophosphate, and total phosphorus) and total suspended solids (TSS) were analyzed by a state-certified contract laboratory using EPA and APHA techniques. UNCW also computed inorganic nitrogen to phosphorus molar ratios for relevant sites (N/P). Chlorophyll *a* was run at UNCW-CMS as described above, except filters were ground using a Teflon grinder prior to extraction.

For a large wet detention pond (Ann McCrary Pond on Burnt Mill Creek) and for a constructed wetland on Kerr Avenue (at the headwaters area of Burnt Mill Creek) UNCW collected data from input (control) and outfall stations. This data was used to test for statistically significant differences in pollutant concentrations between pond input and output stations. The data were first tested for normality using the Shapiro-Wilk test. Normally distributed data parameters were tested using the paired-difference t-test, and non-normally distributed data parameters were tested using the Wilcoxon Signed Rank test. Statistical analyses were conducted using SAS (Schlotzhauer and Littell 1987).

Wilmington Watersheds Yearly Monitoring Report

(The following is the Executive Summary from Environmental Quality of Wilmington and New Hanover County Watersheds 2005-2006)

ENVIRONMENTAL QUALITY OF WILMINGTON AND NEW HANOVER COUNTY WATERSHEDS 2006-2007

by

Michael A. Mallin, Matthew R. McIver, Mary Tavares, Mary I.H. Spivey, Troy D. Alphin and Martin H. Posey,

CMS Report 08-01
Center for Marine Science
University of North Carolina Wilmington
Wilmington, N.C. 28409
www.uncw.edu/cmsr/aquaticecology/tidalcreeks

February 2008

Funded by:
The City of Wilmington, New Hanover County and the US EPA 319 Program (through NC Division of Water quality and North Carolina State University)

Executive Summary

This report represents combined results of Year 13 of the New Hanover County Tidal Creeks Project and Year 9 of the Wilmington Watersheds Project. Water quality data are presented from a watershed perspective, regardless of political boundaries. The combined programs involved 11 watersheds and 57 sampling stations. In this summary we first present brief water quality overviews for each watershed from data collected between August 2006 – September 2007.

Barnards Creek – Barnards Creek drains into the Cape Fear River Estuary. It drains a 2,944 acre watershed that consists of is about 17% impervious surface coverage, and a population of 12,547. There was one station sampled in this watershed during 2007, lower Barnard's Creek at River Road. This site had good water quality in terms of algal blooms, BOD, turbidity, and fecal bacteria. It had some issues with low dissolved oxygen, but no extreme problems.

Bradley Creek – Bradley Creek drains the largest tidal creek watershed in the area (6,016 acres), including much of the UNCW campus, into the Atlantic Intracoastal Waterway (ICW).

The watershed contains about 23% impervious surface coverage. Seven sites were sampled, all from shore. In 2007 there were no problems with algal blooms or turbid water. Dissolved oxygen was good to fair at all sites except the branch at College Acres (BC-CA) and the north branch (BC-NB) at Wrightsville Avenue, where the water was rated as poor quality from low dissolved oxygen. Fecal coliform bacteria samples were collected at one station in 2007 (BC-CA) which showed very high fecal bacteria counts. There was one sewage spill in the creek near Wrightsville Avenue in 2007.

Burnt Mill Creek – Burnt Mill Creek drains a 4,288 acre watershed which is extensively urbanized (36% impervious surface coverage) into Smith Creek. Six locations were sampled in 2007. This creek has very poor water quality, with large algal blooms, extensive substandard dissolved oxygen, and major issues with high fecal coliform counts, with all six sites exceeding the human contact standard > 25% of occasions sampled. Restoration efforts are continuing in a joint effort by the City, NCSU, and UNCW funded through the US EPA.

The effectiveness of Ann McCrary wet detention pond and the Kerr Avenue wetland as pollution control devices was poor during 2006. Several water quality parameters indicated a subsequent worsening of the creek from where it exited the detention pond to the downstream Wallace Park and Princess Place sampling stations.

Futch Creek – Futch Creek is situated on the New Hanover-Pender County line and drains a 3,106 acre watershed into the ICW. Six locations were sampled by boat. Futch Creek maintained good microbiological water quality in the lower stations and Foy Creek, as it has since channel dredging at the mouth occurred in 1995 and 1996. Algal blooms, turbidity, and low dissolved oxygen were not problems in 2006-2007. This creek continues to display good water quality relative to other creeks in the New Hanover County tidal creek system, due to generally low development and impervious surface coverage in its watershed.

Greenfield Lake – This lake drains a watershed of 2,560 acres, covered by about 36% impervious surface area. This urban lake was sampled at three tributary sites and three in-lake sites. The three tributaries of Greenfield Lake (near Lake Branch Drive, Jumping Run Branch, and Lakeshore Commons Apartments) all suffered from severe low dissolved oxygen problems. All three of the tributaries also had frequent high fecal coliform counts, and maintained geometric mean counts well in excess of the state standard for human contact waters.

Algal blooms are periodically problematic in Greenfield Lake, and have occurred during all seasons, but are primarily a problem in spring and summer. Fortunately the number of blooms in 2007 dropped considerably from 2006, either a result of the remedial action by the City or less stormwater runoff and lower nutrient inputs as a result of the drought. Low dissolved oxygen was found only at the uppermost lake station GL-2340. High biochemical oxygen demand (BOD5 > 3.0 mg/l) continues to occur at the in-lake stations. Despite the drought, high fecal coliform counts continue to impact the lake.

In spring of 2005 and 2006 several steps were taken by the City of Wilmington to restore viability to the lake. Sterile grass carp were introduced to the lake to control (by grazing) the

overabundant aquatic macrophytes and four SolarBee water circulation systems were installed in the lake to improve circulation and force dissolved oxygen from the surface downward toward the bottom. Also, on several occasions a contract firm applied the herbicide Sonar to further reduce the amount of aquatic macrophytes. These actions led to a major reduction in aquatic macrophytes lake wide. In 2007 there was good dissolved oxygen at two of the stations (especially nearest the SolarBees), but low dissolved oxygen concentrations were measured at GL-2340, near the upper lake. In 2006 and 2007 there was a highly statistically significant relationship within the lake between chlorophyll *a* and BOD5, meaning that the algal blooms are an important cause of low dissolved oxygen in this lake. Thus, a challenge for Greenfield Lake is to continue to reduce the frequency and magnitude of the algal blooms, which will lead to continuing dissolved oxygen improvements.

Hewletts Creek – Hewletts Creek drains a large (5,952 acre) watershed into the Intracoastal Waterway. This watershed has about 19% impervious surface coverage. In recent years this system has been plagued by a number of sewage spills. In 2006-2007 the creek was sampled at five tidal sites and five non-tidal freshwater sites. There were several incidents of low dissolved oxygen seen in our sampling; three at NB-GLR (the north branch at Greenville Loop Rd.) and three at SB-PGR (the south branch at Pine Grove Rd.), although none were severe (below 3.5 mg/L). Fecal coliform bacteria were not sampled at the tidal stations in 2006-2007. One large algal bloom and two minor blooms occurred at NB-GLR and one major and one minor bloom occurred at SB-PGR.

Since January 2004 five non-tidal sites have been sampled in the Hewletts Creek watershed. One site is PVGC-9, draining Pine Valley Country Club. This stream had some low dissolved oxygen problems but particularly high fecal coliform bacteria pollution problems, with counts exceeded State standard on 100% of the occasions sampled in 2007. Generally high nitrate from fertilizer runoff characterizes this stream. The other sites were being sampled to gain pre and post construction information on the water quality of streams entering (DB-1, DB-2, DB-3) and exiting (DB-4) a newly constructed wetland/future park area known as the Dobo site, draining into the headwaters of Hewletts Creek. Dissolved oxygen was low, particularly so at DB-4. Fecal coliform bacteria counts were high at all sites, particularly DB-1 and DB-4 (these sites are essentially drainage ditches).

Howe Creek – Howe Creek drains a 3,264 acre watershed into the ICW. This watershed hosts a population of 4,224 with about 19% impervious surface coverage. Five stations were sampled in Howe Creek in 2006-2007. The drought had a positive effect on water quality in this creek, with lower nutrient and fecal bacteria inputs from less stormwater runoff. Algal blooms and turbidity showed no problems, and only the uppermost station sampled was rated poor for fecal coliform bacteria (the others were rated good for 2006-2007). Dissolved oxygen concentrations were generally good in lower Howe Creek and fair in upper Howe Creek. Since wetland enhancement was performed in 1998 above Graham Pond the creek below the pond at Station HW-GP has had fewer and smaller algal blooms than before the enhancement.

Motts Creek – Motts Creek drains into the Cape Fear River Estuary. This creek was sampled at one station, at River Road. Dissolved oxygen concentrations were below the state standard of 5.0 mg/L on four of seven occasions in 2007 (minimum 2.4 mg/L) for a poor rating. Neither

turbidity nor suspended solids were problematic in 2007, and there was one minor algal bloom. However, fecal coliform bacteria contamination was a problem in Motts Creek, with the State standard of 200 CFU/100 mL exceeded on four of seven occasions (an improvement over the previous year, however). BOD5 samples yielded a mean value of 1.5 mg/L and a median value of 1.6 mg/L, generally higher than the previous year. Thus, this creek showed mixed water quality, with no algal bloom or turbidity problems, but poor dissolved oxygen and fecal coliform conditions.

Pages Creek – Pages Creek drains a 3,039 acre watershed into the ICW. This creek was sampled at nine stations, two of which receive drainage from developed areas near Bayshore Drive (PC-BDUS and PC-BDDS). There were no algal blooms or turbidity problems in 2006-2007. Fecal bacteria water quality was good in the lower creek and fair in the upper stations. Dissolved oxygen levels were generally fair throughout the creek but poor at the uppermost station PC-H. Because of the relatively low watershed development and low amount of impervious surface coverage in the watershed, this is one of the least-polluted creeks in New Hanover County. However, there was one incident of a sewage line spill near PC-H that our sampling detected in June 2007; the County subsequently repaired the problem.

Smith Creek – Smith Creek drains into the lower Northeast Cape Fear River just upstream of where it merges with the Cape Fear River. It has a watershed of 2,880 acres that has about 28% impervious surface coverage, with a population of 25,904. Two estuarine sites on Smith Creek proper, SC-23 and SC-CH were sampled in 2007. Overall the water quality can be described as poor. Dissolved oxygen concentrations were poor at both stations, as were fecal bacteria counts. Turbidity was rated as fair at both sites, and algal blooms appeared to have increased in this creek over recent years.

Whiskey Creek – Whiskey Creek is the southernmost large tidal creek in New Hanover County that drains into the ICW. It has a watershed of 1,344 acres, a population of 7,107, and is covered by approximately 17% impervious surface area. Four stations were sampled from shore along this creek in 2006-2007. Whiskey Creek had low to moderate nutrient loading and only one algal bloom. This creek had good water quality in terms of dissolved oxygen and turbidity in 2006-2007. Fecal coliform bacteria were not sampled in 2006-2007 in Whiskey Creek.

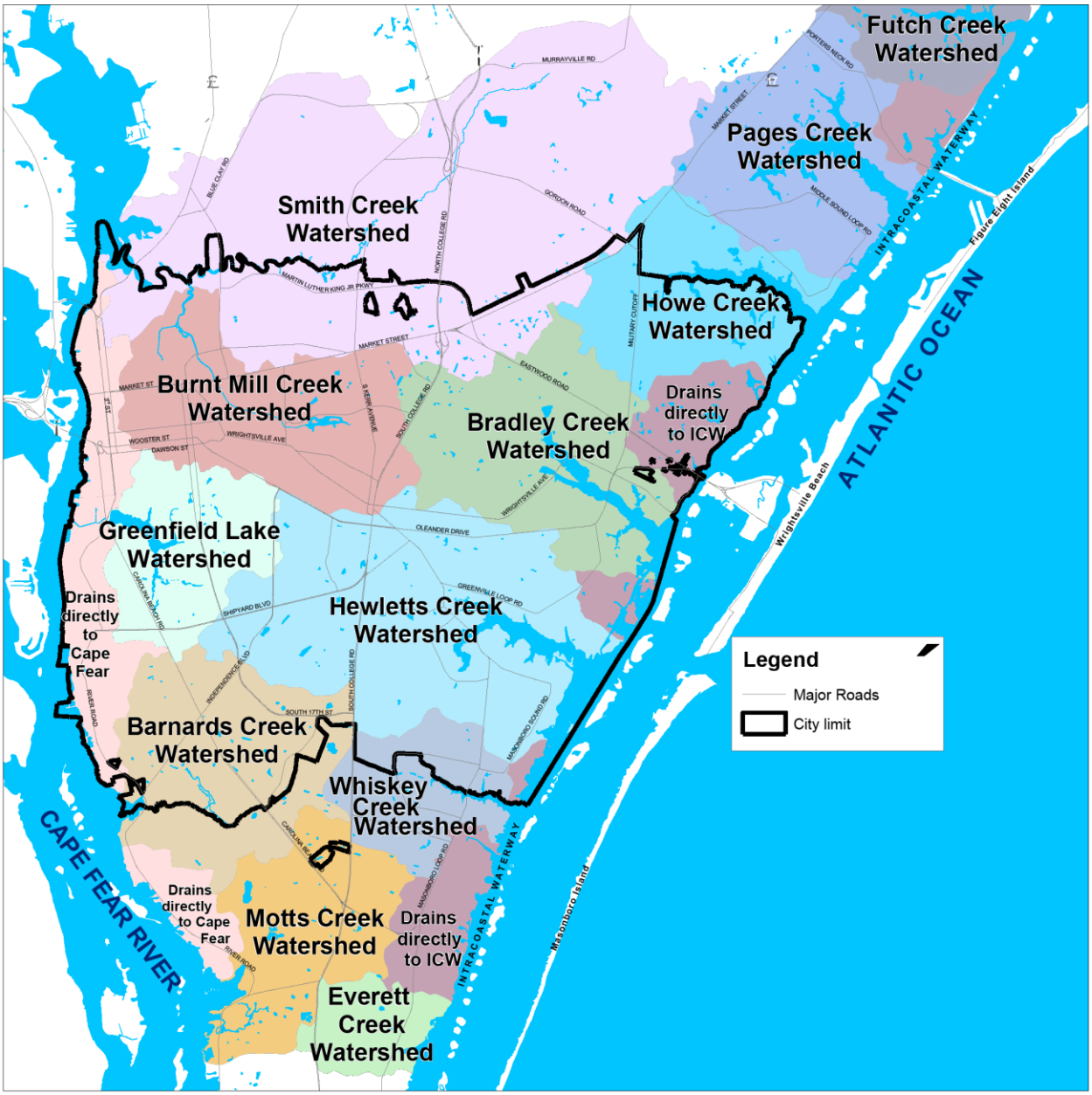
Water Quality Station Ratings – The UNC Wilmington Aquatic Ecology Laboratory utilizes a quantitative system with four parameters (dissolved oxygen, chlorophyll *a*, turbidity, and fecal coliform bacteria) to rate water quality at our sampling sites. If a site exceeds the North Carolina water quality standard for a parameter less that 10% of the time sampled, it is rated Good; if it exceeds the standard 10-25% of the time it is rated Fair, and if it exceeds the standard > 25% of the time it is rated Poor for that parameter. We applied these numerical standards to the water bodies described in this report, based on 2006-2007 data, and have designated each station as good, fair, and poor accordingly (Appendix B).

Fecal coliform bacterial conditions for the entire Wilmington City and New Hanover County Watersheds system (42 sites sampled for fecal coliforms) showed 38% to be in good condition, 10% in fair condition, and 52% in poor condition. Dissolved oxygen conditions system-wide

(57 sites) showed 32% of the sites were in good condition, 35% were in fair condition, and 33% were in poor condition. For chlorophyll *a*, 82% of the stations were rated as good, 12% as fair and 5% as poor.

The drought reduced the inputs of nutrients into the creeks and there were fewer algal blooms in the creeks entering the ICW and Greenfield Lake. However, Burnt Mill and Smith Creeks continued to have algal blooms problems despite the drought. In some systems the reduced runoff from the drought led to lower fecal bacteria inputs, but some water bodies continued to have major fecal bacteria problems regardless (Burnt Mill Creek, upper Bradley Creek, Smith Creek, Greenfield Lake). It is important to note that the three water bodies with the worst water quality in the system also have the most developed watersheds with the highest impervious surface coverage (Burnt Mill Creek – 36% impervious coverage; Greenfield Lake – 36% impervious coverage; Smith Creek – 28% impervious coverage).

Wilmington Watersheds Map



NPDES STORWMATER PERMIT BMPS & 07/08 REPORTING

2007-2008 PROGRAM HIGHLIGHTS

Public Education & Outreach

- Developed comprehensive summary of target pollutants, sources, and target audience.
- Pet waste and lawn care brochures were translated into Spanish.

Public Involvement & Participation

- A public meeting was held to gather public input for revising the City's stormwater ordinance.
- 6 watershed clean-up events were held utilizing volunteers from the community.

Illicit Discharge Detection and Elimination

- Implemented Stormwater Ordinance Team comprised of City staff to help modify existing City stormwater ordinance with respect to NPDES Phase II requirements.
- Conducted storm water inventory mapping project for the system located in the older downtown area of the City. This, in part, will help identify cross-connections to the City's MS4.

Post Construction Site Runoff Controls

- Conducted bi-annual inspections on privately owned BMPs located within the City limits in order to ensure that maintenance requirements were being met by property owners.
- Develop strategies to use new software program to help assist with managing BMP maintenance inspections.

Pollution Prevention and Good Housekeeping

- Conducted Staff training for City Municipal Operations.
- Conducted reviews for 3 City facilities that currently are issued a Stormwater Pollution Prevention Plan.

Other

- Complete mapping pilot project in preparation for full system inventory and update initiative.
- Established preliminary locations for outfall point location in GIS based on overland flow patterns and best available current inventory mapping.

PUBLIC EDUCATION AND OUTREACH

1. Objectives for Public Education and Outreach

(a) Distribute educational materials to the community.
(b) Conduct public outreach activities.
(c) Raise public awareness on the causes and impacts of stormwater pollution.
(d) Inform the public on steps they can take to reduce or prevent stormwater pollution.

2. BMPs for Public Education and Outreach

The permittee shall implement the following BMPs to meet the objectives of the Public Education and Outreach Program and shall notify the Division prior to modification of any goals.

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5
(a) Identify target pollutants and target pollutant sources	Identify the target pollutant and target pollutant sources the permittee's public education program is designed to address and why they are an issue.	X				

07-08 Accomplishments

A comprehensive summary of target pollutants, sources, and target audience was developed and is included in the Public Education & Outreach Appendix. This summary identifies several non- point source pollutants that our public education program addresses, an explanation of why these particular pollutants were chosen, the target audience(s) for each pollutant, and suggested strategies for educating the public about each pollutant. This BMP was completed in Year 1.

Stormwater Services specifically targets the following pollutants:

- Pet Waste
- Fertilizer
- Pesticides
- Yard Waste
- Sediment
- Litter
- Auto Fluids
- Car Washing Soaps

08-09 Proposed Objectives

Utilize comprehensive summary of target pollutants, sources, and audience to guide education and outreach efforts. This document will be modified and updated as audience demographics and other variables change over time.

(b) Identify target audiences	Identify the target audiences likely to have significant storm water impacts and why they were selected.	X				

07-08 Accomplishments
See explanation above. This section is contained in Public Education & Outreach Appendix as part of a comprehensive summary. This BMP was completed in Year 1.

08-09 Proposed Objectives
Modify audience as this variable may change over time.

(c) Informational Web Site	Promote and maintain internet web site. Examples include, but are not limited to: Post newsletter articles on stormwater, information on water quality, stormwater projects and activities, and ways to contact stormwater management program staff.	X				

07-08 Accomplishments
Stormwater Services web address: http://www.wilmingtonnc.gov/publicservices/stormwater

Stormwater Services continues to maintain and update an educational stormwater website, featuring general stormwater info, news and events, capital projects, stormwater brochures & newsletters, Wilmington watersheds, maintenance information, BMPs, school programs, storm drain marking, and more. In addition, many of our stormwater documentaries, public service announcements, and slide shows are posted on the City's website in the online videos section.

All educational brochures, newsletters, citizen's guides, reports, monitoring data, and other publications are posted and/or linked to our website and are accessible at anytime on the website for downloading and/or printing.

Stormwater webpages are updated on a monthly basis, with more frequent updating of the News & Events page. In addition, our website address is included on all educational stormwater literature and materials to drive traffic to the website.

08-09 Proposed Objectives
Add pertinent local News and Events to Stormwater Services webpages on a regular basis.

Upload new and revised stormwater publications including brochures and newsletters.

(d) Develop and distribute public education materials to identified user groups. For example, schools,	Develop general stormwater educational material to appropriate target groups as likely to have a significant stormwater impact. Instead of developing its own materials, the permittee may rely on state-		X			

homeowners, and/or businesses.	supplied Public Education and Outreach materials, as available, when implementing its own program.					

07-08 Accomplishments

Stormwater Services has developed many educational stormwater resources including brochures, bookmarks, door hangers, newsletters, comprehensive citizen's guide on BMPs, and educational giveaways. Educational materials are distributed to the public in a variety of ways including targeted mailings, special events, public meetings, school presentations, and community/HOA presentations.

Titles of these educational materials are listed below and included in the Public Education & Outreach Appendix.

- Stormwater Tips for Homeowners
- Stormwater Tips for Businesses
- Stormwater Top 10 List
- What is a Watershed?
- What Puts the Green in Greenfield Lake?
- Pet Waste
- Car Care
- Lawn Care & Landscaping BMPs
- Yard Waste Disposal
- Household Hazardous Waste
- Think Before you Put it in the Sink or Trash
- Illicit Discharge
- The Shortnose Sturgeon: An Endangered Species of the Cape Fear River
- Lower Cape Fear Stewardship Program
- Stormwater Services General Brochure
- Clean Waterways bookmarks, pens, magnets, t-shirts, water bottles, etc.

Several brochures were translated to Spanish. These brochures were pet waste, yard waste, top 10 list, and watershed flyer.

This year, pet waste education brochures were mailed to specific target neighborhoods in response to complaints about pet waste. Materials were also distributed by the Code Enforcement Officer to landscapers and lawn maintenance companies that were in violation of the City's debris disposal ordinance. Public education materials were also distributed at public meetings, Earth Day, and by citizen request.

08-09 Proposed Objectives

Revise Homeowner brochure, post on website, reprint for distribution.

Send targeted mailings in response to neighborhood complaints and citizen requests about pet waste and lawn care.

(e) Media Campaign	Document campaign reach and frequency to public for each broadcast media like radio and TV, (including those elements implemented locally or through a			X		

	cooperative agreement).					

07-08 Accomplishments
Stormwater Services funds an annual media outreach campaign on major network and broadcasting stations, including TV, radio, and newspaper. Over the years, we have established valuable partnerships with many of these stations which have allowed us to extend our dollar by receiving "buy one get one free" or "matching" ads. In essence, we buy a PSA and we get one free. See the appendix for schedules, reach, and frequency.

Placing clean water ads in the mass media has proven to be an effective method for reaching many different segments of the population with stormwater messages. We are able to target specific audiences with pollutant messages (i.e. target pet waste ads to pet owners).

In addition, Stormwater Services regularly develops and implements a media campaign on the City's cable access channel, GTV-8, to broadcast clean water PSAs, documentaries, and educational slide shows. Stormwater Services is building on watershed marketing research which indicates that mass media is the most influential medium for reaching a diverse public audience. This research also states that the public prefers the comfort and perceived legitimacy of the mass media, particularly TV. Utilizing GTV-8, we are able to run a variety of stormwater media and to repeat messages frequently. Many of these ads also air on the City's video webpage and are available for viewing and downloading.

08-09 Proposed Objectives
Broadcast educational stormwater PSAs on Cumulus radio stations, targeting pet waste and lawn care activities.

Broadcast educational stormwater PSA on WECT-TV with pet waste, fertilizer, and/or the state-developed Johnny Fishpatrick stormwater ads.

(f) Establish Hotline/Help line	Maintain a stormwater hotline/helpline.			X		

07-08 Accomplishments
A workgroup was convened to revise the current City stormwater ordinance. Once this revision is complete, it will enable us to establish a hotline for the public to report illicit discharges and other stormwater infractions. The City is on track to establish this hotline by Year 3. Currently, citizen reports and complaints are directed to the phone # for Stormwater Administration, then given to the appropriate employee to respond.

08-09 Proposed Objectives
Continue to revise ordinance to meet year 3 requirement to establish citizen's hotline.

(g) Establish a Public Education and Outreach Program and	The permittee's outreach program, including those elements implemented locally or through a cooperative	X	X	X	X	X

implement within 12 months of the permit issue date.	agreement, must include at least two of the following: • Newspaper articles, press releases and/or paid advertisements (i.e., inserts) • Kiosks and signage • Targeted direct mail • Displays at the point-of purchase • Utility bill inserts The permittee's outreach program, including those elements implemented locally or through a cooperative agreement, must include at least two of the following: • Public meetings • Community events • Contest • Storm drain marking • Stream and Litter cleanups • Group presentation and/or speeches The permittee's outreach program, including those elements implemented locally or through a cooperative agreement, must include at least three of the following: • News coverage • Workshops and class room outreach • Distributing promotional giveaways and specialty items • Brochures, displays, signs, welcome packets, and pamphlets • Local cable access • Newsletters For each media, event or activity, including those elements implemented locally or through a cooperative agreement, measure and record the extent of exposure.					

07-08 Accomplishments

Stormwater Services engages in many of these educational elements, above the required minimum established by the permit. These activities and events are listed in table in the Public Education and Outreach Appendix.

08-09 Proposed Objectives

With the formation of the new Cape Fear Public Utility Authority, we will explore the possibility of including stormwater messages in utility bills.

Merge the current Stormwater Watch Newsletter into the Citywide Newsletter to increase distribution to 44,000 citizens.

Stormwater Services will partner with the NC Coastal Federation, UNCW, New Hanover Soil & Water Conservation District, County and City Planning to conduct tidal creek meetings for the public in April 2008.

PUBLIC INVOLVEMENT AND PARTICIPATION

1. Objectives for Public Involvement and Participation

(a) Provide opportunities for the public, including major economic and ethnic groups, to participate in program development and implementation.
(b) Comply with applicable state and local public notice requirements.

2. BMPs for Public Involvement and Participation

The permittee shall implement the following BMPs to meet the objectives of the Public Involvement and Participation Program and shall notify the Division prior to modification of any goals.

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5
(a) Administer a Public Involvement Program	Develop and implement a Public Involvement and Participation Program, as outlined in (b) through (e) below.	X	X			
(b) Allow the public an opportunity to review and comment on the Stormwater Plan	Conduct at least one public meeting in year 2 to allow the public an opportunity to review and comment on the Stormwater Plan.		X			

07-08 Accomplishments

The City of Wilmington Stormwater Services & Planning Departments held a public meeting on January 17th, 2008 to gain public input on revising the City's current stormwater ordinance. Meeting attendees were asked to provide feedback in the areas of enforcement, pet waste, yard waste, illicit discharge, and post construction site controls. Attendees also provided feedback in the form of a questionnaire and survey. The video, slideshow and results of the public meeting were posted on our website and will be utilized to develop changes to the ordinance. Results are included in the Appendix.

This meeting was advertised in accordance with state and local public notice requirements. It was advertised in the Wilmington Star News, GTV-8, on the City's website, and via press release.

08-09 Proposed Objectives

Continue to work on revising the City's stormwater ordinance to meet required deadlines.

Utilize feedback from public meetings to guide ordinance revisions.

Give stakeholders the opportunity to participate throughout the revision process.

(c) Organize a volunteer community involvement program	Organize and implement a volunteer stormwater related program, locally or through a cooperative agreement, to promote ongoing citizen participation. Examples include, sponsoring and participating in Big Sweep, Forming partnerships with local businesses, Adopt a stream, Adopt a street, promoting volunteer presentations, Creek crawls, storm drain stenciling, and poster contest	X				

07-08 Accomplishments

This BMP was met by Cape Fear River Watch in the form of watershed clean-ups, volunteer creek monitoring, wetland monitoring and plantings, and educational workshops for the community.

For the past few years, the City of Wilmington has contracted annually with Cape Fear River Watch (CFRW) and New Hanover Soil & Water Conservation District (NHSWCD) to implement public involvement and participation activities, as well as education and outreach activities. Both organizations sign a yearly contract with specified deliverables that enable the City to meet many NPDES BMP requirements. Contract deliverables and yearly reports for each agency are included in the Public Involvement and Participation Appendix.

08-09 Proposed Objectives

Continue to contract with Cape Fear River Watch and New Hanover Soil & Water Conservation District to help us meet NPDES Public Involvement and Education requirements.

(d) Establish a mechanism for Public involvement	Established mechanism for public involvement, for example, a citizens' or stakeholders' group(s) that provide input on stormwater issues and the stormwater program.	X				

07-08 Accomplishments

The City of Wilmington Stormwater Services & Planning Departments held a public meeting on January 17th, 2008 to gain public input on revising the City's current stormwater ordinance. Meeting attendees were asked to provide feedback in the areas of enforcement, pet waste, yard waste, illicit discharge, and post construction site controls. Attendees also provided feedback in the form of a questionnaire and survey. The video, slideshow and results of the public meeting were posted on our website and will be utilized to develop changes to the ordinance. Results are included in the Appendix.

08-09 Proposed Objectives

Stormwater Services will partner with the NC Coastal Federation, UNCW, New Hanover Soil & Water Conservation District, County and City Planning to conduct tidal creek meetings for the public in April 2008.

Continue to contract with Cape Fear River Watch and New Hanover Soil & Water Conservation District to help us meet NPDES Public Involvement and Education requirements.

Give stakeholders opportunities to participate throughout the stormwater ordinance revision process.

Investigate the use of an interactive online tool on the Stormwater Services website to allow citizens to offer public input and inquiries.

(e) Establish Hotline/Help line	Maintain a stormwater hotline/helpline.			X		

07-08 Accomplishments

A workgroup was convened to revise the current City stormwater ordinance. Once this revision is complete, it will enable us to establish a hotline for the public to report illicit discharges and other stormwater infractions. The City is on track to establish this hotline by Year 3. Currently, citizen reports and complaints are directed to the phone # for Stormwater Administration, then given to the appropriate employee to respond.

08-09 Proposed Objectives

Continue to revise the stormwater ordinance to meet Year 3 requirement to establish hotline.

ILLICIT DISCHARGE DETECTION AND ELIMINATION

1. Objectives for Illicit Discharge Detection and Elimination

(a) Detect and eliminate illicit discharges, including spills and illegal dumping to the Permittee's MS4.
(b) Address significant contributors of pollutants to the MS4. The permittee may require specific controls for a category of discharges, or prohibit that discharge completely, if one or more of these categories of sources are identified as a significant contributor of pollutants to the MS4.
(c) Implement appropriate enforcement procedures and actions.
(d) Develop a map showing the permittee's major MS4 outfalls to state waters receiving discharges.
(e) Inform employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.

2. BMPs for Illicit Discharge Detection and Elimination

The permittee shall implement the following BMPs to meet the objectives of the Illicit Discharge Detection and Elimination Program and shall notify the Division prior to modification of any goals.

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5
(a) Develop/Implement Illicit Discharge Detection and Elimination Program	Develop and implement an Illicit Discharge Detection and Elimination Program including provisions for program assessment and evaluation.			X		

07-08 Accomplishments

The City organized a Stormwater Ordinance Team (SWOT) to help address modifications to the existing stormwater ordinance. The ordinance is being developed to address illicit discharges regarding detection, enforcement and elimination. The ordinance modification will help to close the gap between the existing Stormwater ordinance and the Public Utilities ordinance related to illicit discharges to the MS4.

The organization of the SWOT will help develop an Illicit Detection and Elimination Program. Currently, City Staff are going through revisions to help finalize the stormwater ordinance.

08-09 Proposed Objectives

Continue progress on final draft of Stormwater Ordinance for the State's review and for adoption by City Council.

(b) Establish and maintain appropriate legal authorities	Establish and maintain adequate ordinances or other legal authorities to prohibit illicit discharges and enforce the approved Illicit Discharge Detection and Elimination Program.			X		

07-08 Accomplishments

The current Public Utilities ordinance defines wastewaters that are required to be discharged into the sanitary sewer system. For the previous year, the City utilized the existing Public Utilities ordinance to address discharges of regulated wastewaters to natural outlets. Progress is being made to modify existing stormwater ordinance through the SWOT to address releases to the City's MS4 that are not defined as a regulated wastewater.

08-09 Proposed Objectives

Continue efforts for the adoption of a final modified stormwater ordinance. The adoption of the existing modified Stormwater ordinance, as addressed through the efforts of the City's SWOT, will establish legal authorities to address illicit discharges.

(c) Develop a Storm Sewer System Base Map and Inventory of Major Outfall.	Map identifying major outfalls and stormwater drainage system components. At a minimum, components include major outfalls and receiving streams. Established procedures to continue to identify, locate, and update map of drainage system.				X	

07-08 Accomplishments

All receiving waterbodies are identified and mapped. Many outfalls along the intracoastal waterway or associated estuarine areas and Burnt Mill Creek have been located and mapped to include attribute information such as size, material, condition, abnormal flow at time of last observation, etc. Preliminary outfall locations have been established for many of the remaining waterbodies within or adjacent to the City. This includes the areas along the Cape Fear River, Smith Creek, and Barnards Creek. Digital Terrain Model data for the City and an area extending approximately 1.5 to 2 miles outside the City limit has been developed from NC Floodplain Mapping LIDAR data. The terrain model yields overland flow patterns that have been analyzed to determine preliminary locations of outfalls. This data derived from overland flow also gives a preliminary indication of flow patterns and catchment boundaries based only on overland flow.

Full system mapping efforts have been underway since 1999 and have focused mainly on those areas which have been annexed by the City. A pilot project designed to fully map the natural and constructed drainage features as well as enable update and maintenance of MS4 data in the City GIS system was completed in March 2008. The City will commence efforts to bring

together the several mapping datasets that have been completed over the years and integrate these into a single dataset of drainage features. Part of this effort also includes finalizing a database design that accommodates all the requirements of our NPDES Phase II permit and anticipates requirements related to TMDL Water Quality Recovery Programs and associated monitoring.

08-09 Proposed Objectives
Stormwater system inventory database design finalization

In-house GPS data collection routine development for update/maintenance of existing data and outfall monitoring

TMDL Water Quality Recovery Program preparatory actions in anticipation of TMDL classifications for waters in the City's jurisdiction. This will include continued development of terrain and system data to assist in the identification of contributing areas whenever a pollutant of concern is documented.

(d) Inspection/detection program to detect dry weather flows at MS4 outfalls	Establish written procedures for detecting and tracing the sources of illicit discharges and for removing the sources or reporting the sources to the State to be properly permitted.			X		

07-08 Accomplishments
The City elected not to focus on procedures for dry weather flows until existing stormwater ordinance has been modified and adopted to allow for enforcement and removal procedures.

08-09 Proposed Objectives
Continue to focus attention on adopting modified stormwater ordinance and finalizing final draft for the State's review. Continue to revise ordinance to meet year 3 requirement to establish written procedures.

(e) Employee training	Conduct training for appropriate municipal staff on detecting and reporting illicit discharges.			X		

07-08 Accomplishments
Through past training sessions for identifying illicit discharges, Stormwater crews are knowledgeable in detecting and reporting suspect discharges to appropriate City staff. Reporting methods are currently in place for detecting and eliminating regulated wastewater to

the City's MS4 but will need to be to be reevaluated as the new Water and Sewer Authority begin implementation.

08-09 Proposed Objectives
Continue to educate City Staff on identifying illicit discharges and provide periodic training refresher sessions to meet year 3 requirements.

(f) Provide public education	Inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.				X	

07-08 Accomplishments
The City elected not to undertake establishing a reporting mechanism for the public this year.

08-09 Proposed Objectives
The City will reevaluate the above objective this coming year to determine how to accomplish goal and to meet year 4 requirements.

(g) Establish a public reporting mechanism	Establish and publicize reporting mechanism for the public to report illicit discharges. Establish citizen request response procedures.				X	

07-08 Accomplishments
The City elected not to undertake establishing a reporting mechanism for the public this year.

08-09 Proposed Objectives
The City will reevaluate the above objective this coming year to determine how to accomplish goal and to meet year 4 requirements. The City's website is to undergo a redesign for the next year and department input to changes will be encouraged. This will provide an opportunity to discuss a public reporting mechanism to the website to address the above objective.

(h) Established procedures to identify and eliminate failed septic system and sanitary sewer overflows.	Establish procedures to identify and report to the County health department failed septic systems located within the permittee's planning jurisdiction. Establish procedures to identify and report sanitary sewer overflows and sewer leaks to the system operator.		X			

07-08 Accomplishments
See notes in Changes/Justification section for item (h).

The City elected not to undertake establishing procedures for identifying failed septic systems this year.

08-09 Proposed Objectives

The City will reevaluate the above objective this coming year to determine how to accomplish goal and to meet year 2 requirements for establishing procedures.

CONSTRUCTION SITE RUNOFF CONTROLS

The permittee relies on New Hanover County to comply with this minimum measure. The New Hanover County Sediment and Erosion Control Program effectively meets the requirements of the Construction Site Runoff Controls by permitting and controlling development activities disturbing one or more acres of land surface and those activities less than one acre that are part of a larger common plan of development. This program includes procedures for public input, sanctions to ensure compliance, requirements for construction site operators to implement appropriate erosion and sediment control practices, review of site plans which incorporates consideration of potential water quality impacts, and procedures for site inspection and enforcement of control measures.

New Hanover County Erosion Control Program information supplied in Appendix E.

POST-CONSTRUCTION SITE RUNOFF CONTROLS

1. Objectives for Post-Construction Site Runoff Controls

(a) Manage stormwater runoff from new development / redevelopment that drains to the MS4 and disturbs an acre or more of land surface, including projects less than an acre that are part of a larger common plan of development or sale.
(b) Provide a mechanism to require long term operation and maintenance of BMPs.
(c) Ensure controls are in place to minimize water quality impacts.

2. BMPs for Post-Construction Site Runoff Controls

The permittee shall implement the following BMPs to meet the objectives of the Post-Construction Stormwater Management Program.

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5
(a) Establish a Post-Construction Stormwater Management Program	Develop and adopt by ordinance (or similar regulatory mechanism) a program to address stormwater runoff from new development and redevelopment. Implement and enforce the program within 24 months of the permit issue date.		X			

07-08 Accomplishments

A stormwater ordinance drafting team has been formed which includes the City Stormwater Services Manager, Environmental and Long Range Planners, a Plan Review Engineer, a Staff Engineer, Senior Engineering Technician, an Outreach & Education Coordinator and a Code Enforcement officer.

The team is drafting a new stormwater ordinance for the management of post-construction stormwater runoff from new development and redevelopment in the framework of the Phase II stormwater model ordinance, an existing City of Wilmington Stormwater Management Ordinance and the Coastal Stormwater rules.

The initial draft has been put through a public review process with a public input meeting held in the City Council chambers on January 17, 2008.

Draft of Stormwater ordinance is underway. The uncertainty of the Coastal Stormwater rules and their applicability to the City's permit requirements may necessitate an extension on the deadline.

08-09 Proposed Objectives

The public would be given another opportunity to review the revised draft ordinance in early Spring of 2008. Stakeholders' meetings for feedback are planned for the Summer of 2008 before the draft goes for State review in the fall. The final draft would be put forward for Planning Commission and City Council adoption in early 2009.

- Stakeholders input meetings in Summer 08
- Complete the ordinance for submission to DWQ for review by October 08
- Adoption of the ordinance by City Council by March 1, 09.
- Schedule is subject to change pending change to NC Coastal Stormwater Rules

(b) Establish strategies which include BMPs appropriate for the MS4	Develop strategies that include a combination of structural and/or non-structural BMPs. Implement them within 24 months of the permit issue date. Provide a mechanism to require long-term operation and maintenance of structural BMPs. Require annual inspection reports of permitted structural BMPs performed by a qualified professional (i.e., someone trained and certified by NC State for BMP Inspection & Maintenance).		X			

07-08 Accomplishments

The new stormwater ordinance being developed contains provisions addressing the use of combinations of structural and non-structural BMPs to manage stormwater runoff. Under the current stormwater management ordinance of the City, permitees of structural BMPs are required to properly maintain their stormwater management systems to ensure long term operation. Additionally, annual inspections are performed by a qualified professional.

The City conducted biannual compliance inspections for privately owned stormwater BMPs in order to ensure maintenance responsibilities are being undertaken by property owners. Inspections were conducted by a City Staff member who has completed the Stormwater BMP Inspection and Maintenance Certificate offered through NC State's Biological and Agricultural Engineering Department (certification #182). An inspection summary is included in Appendix F. In addition, sample inspection reports along with corrective action procedures are provided.

BMP requirements are part of the ordinance. see above.

08-09 Proposed Objectives

Continue biannual inspections for next year to ensure compliance with maintenance requirements. Report items of non-compliance to property owners.

Ordinance adopted by March 09.

(c) Establish nutrient sensitive waters (NSW) protection measures (for programs with development or redevelopment draining to NSW waters)	Develop, adopt, and implement an ordinance (or similar regulatory mechanism) to ensure that the best management practices reduce nutrient loading to the maximum extent practicable. Develop and include a nutrient application (fertilizer and organic nutrients) management program in the Post-construction Stormwater Management Program. In areas where the Environmental Management Commission has approved a Nutrient Sensitive Water Urban Stormwater Management Program, the provisions of that program fulfill the nutrient loading reduction requirement.		X			

07-08 Accomplishments
Per NCDWQ staff, there are no current NSW requirements for our area in the Cape Fear River Basin and there are none on the immediate horizon.

08-09 Proposed Objectives
Staff will continue to track this issue through NCDWQ.

(d) Establish a program under the Post-Construction minimum measure to control the sources of fecal coliform to the maximum extent practicable	Coordinate with County health department to control the known sources of fecal coliform to the maximum extent practicable. Implement within 24 months of the permit issue date.		X			

07-08 Accomplishments
Working to establish domestic animal waste ordinance as part of ordinance revision process.

Evaluation of preferred BMPs for fecal control.

08-09 Proposed Objectives
Ordinance adopted by March 09.

(e) City Code, Permitting Regulations, Easement, and/or Deed Restrictions and	Ensure development activities will maintain the project consistent with approved plans.		X			

Protective Covenants						

07-08 Accomplishments

Current City of Wilmington stormwater management ordinance stipulates among other requirements for stormwater management after construction that:

- Record (as-built) drawings (reproducible mylar) for all stormwater management facilities certified by an authorized registered professional must be provided to the City for permanent record.
- When deemed necessary by the City, an easement in a form approved by the City attorney, granting the City and its agents and representatives adequate and perpetual access to the facility and sufficient area for inspection and maintenance, if necessary, by the City, its agents and representatives. Said easement shall be filed in the New Hanover County Registry, at the expense of the applicant, and shall bind all subsequent owners and assigns of the facility and of the property on which the facility is located.
- Draft maintenance provisions are part of the draft ordinance.

08-09 Proposed Objectives

The following excerpt from the new stormwater ordinance under draft would become operational upon the adoption of the final draft by City council, that:

> The approval of the stormwater permit shall require an enforceable restriction on property usage that runs with the land, such as recorded deed restrictions or protective covenants, to ensure that future development and redevelopment maintains the site consistent with the approved project plans.

Ordinance adopted by March 09

(f) Operation and Maintenance Plan	Implement or require an operation and maintenance plan that ensures the adequate long-term operation of the structural BMPs required by the program. The operation and maintenance plan may require the owner of each structural BMP to submit a maintenance inspection report on each structural BMP annually to the local program.					X

07-08 Accomplishments

The City currently conducts its own compliance inspections for BMP maintenance and operations as addressed above in item (b).
Draft maintenance provisions as part of the draft ordinance.

08-09 Proposed Objectives

City staff will continue to inspect all privately owned BMPs and submit inspection reports as necessary for this annual report .

Ordinance adopted by March 09

(g) Setbacks for Built-upon Areas	Require built upon areas to be located at least 30 feet landward of all perennial and intermittent surface waters except as provided for in the Permittee's approved Post-Construction Stormwater Ordinance. For purposes of this section, a surface water shall be present if the feature is shown on either the most recent version of the soil survey map prepared by the Natural Resources Conservation Service of the United States Department of Agriculture or the most recent version of the 1:24,000 scale (7.5 minute) quadrangle topographic maps prepared by the United States Geologic Survey (USGS). Relief from this requirement may be allowed when surface waters are not present in accordance with the provisions of 15A NCAC 02B .0233(3)(a).		X			

07-08 Accomplishments
30 foot setback as part of draft ordinance.

08-09 Proposed Objectives
Ordinance adopted by March 09.

POLLUTION PREVENTION AND GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS

1. Objective for Pollution Prevention and Good Housekeeping for Municipal Operations

Prevent or reduce stormwater pollution from municipal operations.

2. BMPs for the Pollution Prevention and Good Housekeeping for Municipal Operations

The permittee shall implement the following BMPs to meet the objectives of the Pollution Prevention and Good Housekeeping Program and shall notify the Division prior to modification of any goals.

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5
(a) Develop an operation and maintenance program	Develop an operation and maintenance program for structural stormwater BMPs , storm sewer system maintenance which may include street sweeping, and municipal operations such as recycling and household hazardous waste and oil collection.		X			

07-08 Accomplishments

The City currently has a program for the operation and maintenance of all City owned structural BMPs, storm sewer system, and street sweeping. In addition, there is a recycled oil program for City operations and an annual Household hazardous waste collection day (conducted in cooperation with New Hanover County).

08-09 Proposed Objectives

Implement a plan to help formalize the data collected for each individual activity mentioned above so that this may be placed in an annual report for review.

(b) Develop Site Pollution Prevention Plan for Municipal Facilities	Develop and implement Site Pollution Prevention Plan for Municipal Facilities owned and operated by the permittee with the potential for generating polluted stormwater runoff that has the ultimate goal of preventing or reducing pollutant runoff.			X		

07-08 Accomplishments
The City currently holds 3 Stormwater Pollution Prevention plans (SP3) for its municipal facilities to address the above goal:

- Southside Wastewater Treatment Plant -NPDES General Permit NCG110000 (date of issuance 5/1/03*)
- Northside Wastewater Treatment Plant - NPDES General Permit NCG110000 (date of issuance 5/1/03*)
- Wilmington Transit Authority -NPDES General Permit NCG080000 (date of issuance 7/13/03)

*The two treatment plant facilities permits will transfer to the CFPUA.

Currently, the City is finalizing a Spill Prevention Control and Countermeasure (SPCC) Plan for 2 additional facilities (City Operations Complex and Wilmington Police Headquarters) that dispense gasoline to City vehicles.

08-09 Proposed Objectives
Continue to review and update SP3s as needed. Implement the SPCC plans for the two additional facilities.

(c) Inspection and evaluation of facilities, operations, and the MS4 system and associated structural BMPs.	Maintain an inventory of facilities and operations owned and operated by the permittee with the potential for generating polluted stormwater runoff, including the MS4 system and associated structural BMPs. Conduct inspections at facilities and operations owned and operated by the permittee for potential sources of polluted runoff, the stormwater controls, and conveyance systems. Evaluate the sources, document deficiencies, plan corrective actions, implement appropriate controls, and document the accomplishment of corrective actions.				X	

07-08 Accomplishments
The existing SP3 plans the City currently holds, as mentioned in item (b) accomplish this goal. The plans are reviewed each year and updated as necessary with regard to any changes to the existing plan.

08-09 Proposed Objectives
Continue monitoring City operated sites for compliance with existing SP3s. Update as needed.

(d) Conduct staff training	Conduct staff training specific for		X			

	pollution prevention and good housekeeping procedures.					

07-08 Accomplishments
The City conducted staff training for department supervisors and crew leaders on Pollution Prevention and Good Housekeeping for City facilities in December 2007. A copy of this presentation can is found in Appendix G.

08-09 Proposed Objectives
Conduct another training session for staff members who were not able to attend the December session.

Conduct training to field crews in various departments as needed or as requested by supervisors.

(e) Review of municipality owned or operated regulated industrial activities	Conduct annual review of the industrial activities with a Phase I NPDES stormwater permit owned and operated by the permittee. Review the following aspects: the Stormwater Pollution Prevention Plan where one is required, the timeliness of any monitoring reports required by the Phase I permit, and the results of inspections and subsequent follow-up actions at the facilities.			X	X	X

07-08 Accomplishments
The City reviewed and updated (if needed) existing SP3s for the three City facilities that currently hold industrial permits. The 2007 site reviews and inspections indicated compliance with their respective permits.

08-09 Proposed Objectives
Continue to monitor and conduct annual reviews of City sites with SP3s for compliance with plan.

(f) Spill Response Procedures	Establish spill response procedures for municipal operations owned and operated by the permittee with the potential to generate polluted stormwater runoff.		X			

07-08 Accomplishments
The City's Operations Complex and the Police Headquarters each required an SPCC plan as recommended by our hired consultant. The City is currently finalizing the two plans and will begin implementing them in 2008. Each plan addresses spill response procedures for each site.

08-09 Proposed Objectives
The City's consultant will conduct on-site training to designated City staff with regards to spill response and procedures.

(g) Prevent or Minimize Contamination of Stormwater Runoff from all areas used for Vehicle and Equipment Cleaning	Describe measures that prevent or minimize contamination of the stormwater runoff from all areas used for vehicle and equipment cleaning. Perform all cleaning operations indoors, cover the cleaning operations, ensure washwater drain to the sanitary sewer system, collect stormwater runoff from the cleaning area and providing treatment or recycling, or other equivalent measures. If sanitary sewer is not available to the facility and cleaning operations take place outdoors, the cleaning operations shall take place on grassed or graveled areas to prevent point source discharges of the washwater into the storm drains or surface waters. Where cleaning operations cannot be performed as described above and when operations are performed in the vicinity of a storm drainage collection system, the drain is to be covered with a portable drain cover during clean activities. Any excess ponded water shall be removed and properly handled prior to removing the drain cover. The point source discharge of vehicle and equipment wash waters, including tank cleaning operations, are not authorized by this permit and must be covered under a separate NPDES permit or discharged to a sanitary sewer in accordance with applicable industrial pretreatment requirements.		X			

07-08 Accomplishments

Vehicle maintenance and cleaning conducted at the City's Operations complex, which was completed in 2006, occurs at a wash down station equipped with an oil water separator that accepts wash water and directs it to the sanitary sewer.

At the two Wastewater Treatment Plants, any equipment washed down or any maintenance on small equipment is done in an area where runoff is collected and routed back to the headworks of the plant. Spills are contained with dry granular absorbents.

The current SP3s for the individual City sites address the above concerns for Good Housekeeping procedures.

08-09 Proposed Objectives

Continue monitoring each respective SP3 for compliance. Update as needed

SECTION H: THREATENED OR ENDANGERED SPECIES

1. Certain waters provide habitat for federally-listed aquatic animal species that are listed as threatened or endangered by the U.S. Fish and Wildlife Service or National Marine Fisheries Service under the provisions of the Endangered Species Act, 16 U.S.C. 1531-1544 and subsequent modifications.

2. The shortnose sturgeon (*Acipenser brevirostrum*) was listed as endangered on March 11, 1967 (32 FR 4001) and remained on the endangered species list with enactment of the ESA in 1973. Shortnose sturgeon occur in most major river systems along the eastern seaboard of the United States. Shortnose sturgeon inhabit the main stems of their natal rivers, migrating between freshwater and mesohaline river reaches. Spawning occurs in upper, freshwater areas, while feeding and overwintering activities may occur in both fresh and saline habitats.

3. Under the provisions of the Final Recovery Plan published by the National Marine Fisheries Service (NMFS) in December 1998, the permittee shall implement measures to increase awareness of shortnose sturgeon and their status by formulating a public education program that generates public interest in sturgeon and sturgeon recovery by contacting media outlets, suggesting feature stories, and using existing forums for educating the public (e.g., public aquaria, FWS Partners for Wildlife Program, private foundations). Articles, posters, and pamphlets should be published to increase public knowledge of shortnose sturgeon and their unique and complex life history. This information may include identifiable features of the species, listing status, range, susceptibility to incidental captures, and a number or address to report sightings or captures. The permittee shall offer to work with schools to develop and evaluate educational materials and curricula that introduce students to sturgeons, the river/estuarine environment, and the ESA.

07-08 Accomplishments

An action plan was developed to serve as guidance for conducting public outreach and education about the endangered Shortnose Sturgeon. Education materials were developed to incorporate the following information about this endangered fish:

- federal listing status
- identifiable features
- life history
- range/local habitat
- reasons for decline in species population
- susceptibility to incidental captures
- barriers to recovery (threats and solutions)
- number to report sightings or captures

Several educational items were created and utilized to educate the public this year; samples are included in the Threatened or Endangered Species Appendix:

- Shortnose Sturgeon brochure

- Shortnose Sturgeon bookmark
- Shortnose Sturgeon educational materials were distributed at special events and public meetings
- A seminar was held by Cape Fear River Watch which focused on several fish in the Cape Fear River, including the Shortnose Sturgeon

08-09 Proposed Objectives

Incorporate information about the Shortnose Sturgeon into 8th grade school presentations.

Include information about the Shortnose Sturgeon on Stormwater Services webpages.

Create an educational slideshow to broadcast on the City's cable access channel (GTV-8).

APPENDIX

APPENDIX A – CITY OF WILMINGTON STORMWATER SERVICES DOCUMENTATION

APPENDIX B - PUBLIC EDUCATION AND OUTREACH

APPENDIX C - PUBLIC INVOLVEMENT & PARTICIPATION

APPENDIX D - ILLICIT DISCHARGE DETECTION & ELIMINATION

APPENDIX E - CONSTRUCTION SITE RUNOFF CONTROL

APPENDIX F - POST-CONSTRUCTION SITE RUNOFF CONTROLS

APPENDIX G - POLLUTION PREVENTION & GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS

APPENDIX H - THREATENED & ENDANGERED SPECIES

APPENDIX I – ENFORCEMENT ACTIONS

APPENDIX A

CITY OF WILMINGTON STORMWATER SERVICES DOCUMENTATION

Documentation & information is included in the section labeled Comprehensive Stormwater Management.

APPENDIX B

PUBLIC EDUCATION AND OUTREACH

Included in this section:

- BMP Reporting Table
- Identification of Target Pollutants, Sources, And Target Audiences

DATE / TIME	PLACE	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY OR INFO COLLECTED
BMP(a) Identify Target Pollutants & Sources					
Pollutants and sources are identified in the Appendix					
BMP(b) Identify Target Audiences					
Target audiences are identified for each pollutant in the Appendix.					
BMP(c) Stormwater Website					
Ongoing/ Monthly	Internet, specifically City of Wilmington Stormwater Services webpages	General public; website viewers	Stormwater staff	Update website with stormwater news, events, and other pertinent information	Updated in 07-08: News & Events Publications & Reports Newsletters Capital Projects Watershed Boundaries Citizen's Guide
BMP(d) Develop & Distribute Public Education Materials to Identified User Groups					
7/3/2007	Airlie Gardens	Airlie Gardens Summer Camp	Stormwater staff Airlie Gardens staff	Gave educational stormwater magnets, bags, and pens to campers	20 campers participated
7/28/2007	Downtown Wilmington	City residents and businesses	NHC Democratic Party	Stormwater educational door hangers distributed door-to-door to area residents and businesses	150 door hangers distributed
8/1/2007	Stormwater Office	General public	Stormwater staff	Updated several stormwater brochures, reprinted door hangers	Updated literature

9/8/2007	Stormwater Office	Pet owners	Stormwater staff	Developed new pet waste brochure and magnets for Wilmington Dog Jog Event at Legion Stadium	250 brochures and magnets given for Dog Jog participants
8/27/2007	Stormwater Office	General public	Stormwater staff	Develop stormwater bookmark	New education material
8/23/2007	Stormwater Office	8th grade teachers and students	Stormwater staff	Develop Enviroscape notebook to supplement 8th grade science curriculum on the Hydrosphere and Enviroscape presentations	8th grade teachers receive supplemental resource for Enviroscape presentations that correlates to NC SCOS
11/29/2007	Stewardship Awards Banquet	Homebuilders, architects, real estate professionals, environmental groups	Stormwater staff	Display during banquet, including rain barrel	Education for 100+ homebuilders, real estate professionals, environmental groups
12/5/2007	Employee Workshop	Employees from Public Services, Stormwater, and Parks	Stormwater staff	Pollution prevention and Good Housekeeping workshop for City personnel	16 employees attended
April 2007	Kelly Road area	Kelly Road residents	Stormwater Maintenance staff	Citizen Notice - notification of drainage improvement project with stormwater pollution tips	115 door hangers to Kelly Road citizens
7/10/07	Targeted Direct Mail	Mary Bridgers Park residents	Stormwater staff	Citizen mailing - pet waste education in response to neighborhood complaints	112 notices to Mary Bridgers Park citizens
6/1/2007	Targeted Direct Mail	Pine Valley Drive residents	Stormwater staff	Citizen mailing - pet waste education in response to complaint	27 notices to Pine Valley Drive citizens
5/2/2007	Targeted Direct Mail	23rd St. residents	Stormwater staff	Citizen mailing - pet waste education in response to complaint	12 notices to 23rd St. citizens
2/1/2008	Targeted Direct Mail	Hawthorne Rd. residents	Stormwater staff	Citizen mailing - pet waste education in response to complaint	75 notices to Hawthorne Rd. citizens

BMP(e)	**Media Campaign**				
March - June 2007	TV - WECT-6	TV viewers ages 35-65 in Wilmington	State Stormwater TV Spot: Johnny Fishpatrick Ads also ran simultaneously on 87.7FM radio	:30 second stormwater PSA on network TV 39 spots total	Target Audience: General public Reach: 77.5% for viewers age 35-65 age of 174,000 homes in Wilm Frequency: 2.9 Total cost: $3,730

April - June 2007	Radio - Cumulus Broadcasting/WGNI	Landscapers, homeowners, pet owners, general public	Yard Waste & Pet Waste :30-second PSAs	Two :30 second stormwater PSAs on broadcast radio stations 120 ads total: (60 purchased, 60 free)	Target Audience: Yard caregivers, pet owners, general public Reach: 43,800 adults ages 25-54 Frequency: 10.7 Total cost: $1,800
May - June 2007	Newspaper - Star News	General public, adults, Star News readers	Bon Appetite - State Stormwater Ad	Stormwater print ads in newspaper 8 ads total (1 column by 4") Ran Weds. & Sun. May-June 2007	Target Audience: Adults/general public Reach/daily: 55.8 % or 138,000 adults in New Hanover, Pender & Brunswick Counties Reach/weekly: 57.7% or 143,100 adults in New Hanover, Pender, and Brunswick Counties Frequency: 8 ads total Total cost: $1042
Jun-06	TV - WECT Hurricane Guide - printed	Hurricane Guide recipients; Expo attendees	Water quality ad - keeping yard debris out of drainage system	Stormwater print ad in local hurricane preparation guide 25,000 copies	Target Audience: General public Reach: 25,000+ people Total cost: $10,000 donated ad!
Aug - Sept 2007	Radio - Cumulus Broadcasting/ WGNI & WAAV	Landscapers, homeowners, pet owners, general public	Yard Waste & Pet Waste :30-second PSAs	Two :30 second stormwater PSAs on broadcast radio stations 546 ads total: (273 purchased, 273 free)	Target Audience: Yard caregivers, pet owners, general public Reach: 69,700 adults ages 25-54 Frequency: 5 Total cost: $4,500
Oct - Nov 2007	TV - WECT-6	TV viewers ages 35-65 in Wilmington	State Stormwater TV Spot: Johnny Fishpatrick Ads also ran simultaneously on 87.7 FM radio	:30 second stormwater PSA on network TV 36 ads total	Target Audience: General public Reach: 76.6% for viewers ages 25-64 of 174,000 homes in Wilm Frequency: 2.4 Total cost: $3,035
Ongoing	City GTV-8 and City website	GTV-8 cable access TV viewers	Stormwater Pollutant Messages	Educational :30 second PSAs Several different PSAs airing concurrently or alternating	Target Audience: General public Reach & Frequency: vary due to government programming: Frequency: 2.4 Total cost: $free
Ongoing	City GTV-8 and City website	GTV-8 cable access TV viewers	Stormwater Pollutant Messages; watershed documentaries	5-30 minute clean water documentaries Several different documentaries running concurrently or alternating	Target Audience: General public Reach & Frequency: vary due to government programming: Frequency: 2.4 Total cost: $free

Ongoing	City GTV-8 and City website	GTV-8 cable access TV viewers	Stormwater 101: The Basics	Educational Slideshow (part of Stormwater 101 series) Airing on an ongoing basis or alternating with other stormwater media	Target Audience: General public Reach & Frequency: vary due to government programming: Frequency: 2.4 Total cost: $free
Ongoing	City GTV-8 and City website	GTV-8 cable access TV viewers	Stormwater 101: Pet Waste	Educational Slideshow (part of Stormwater 101 series Airing on an ongoing basis or alternating with other stormwater media	Target Audience: Gen Pub Reach & Frequency: vary due to government programming: Frequency: 2.4 Total cost: $free
Ongoing	City GTV-8 and City website	GTV-8 cable access TV viewers	Stormwater 101: Pesticides	Educational Slideshow (part of Stormwater 101 series Airing on an ongoing basis or alternating with other stormwater media	Target Audience: Gen Pub Reach & Frequency: vary due to government programming: Frequency: 2.4 Total cost: $free
Ongoing	City GTV-8 and City website	GTV-8 cable access TV viewers	Stormwater 101: Yard Waste	Educational Slideshow (part of Stormwater 101 series Airing on an ongoing basis or alternating with other stormwater media	Target Audience: General public Reach & Frequency: vary due to government programming: Frequency: 2.4 Total cost: $free

BMP(f) Establish Hotline / Helpline

This BMP will occur according to schedule in Year 3.

BMP(g) Establish Public Outreach & Education Program & Implement Within 12 Months.

Newspaper Articles

3/11/2007	Wilmington Star News	General public	By Gareth McGrath	Newspaper Article - Eco-Friendly Developments Catching On	Low impact development
4/11/2007	Wilmington Star News	General public	By Brenda Birmelin	Newspaper Article - Natural Solution	Rain gardens
5/14/2007	Wilmington Star News	General public	By Gareth McGrath	Newspaper Article - As County Grows, Creeks and Streams Suffer	Water quality
6/29/2007	Wilmington Star News	General public	Star News reporter	Newspaper Article - Group Butts in Downtown	Cigarette butt litter
Summer 2007	UNCW Magazine	UNCW alumni, supporters	By Joy Davis, UNCW	UNCW Magazine Article - Conquering an Uncertain Environment	UNCW EVS intern Program

7/6/2007	Lumina News	General, beach patrons	By Marimar McNaughton	Lumina News Article - Retrofitting Beach Homes And Gardens For Stormwater Management	Stormwater BMPs, photos of rain barrel at the Stormwater Demonstration Site
7/17/2007	NCSU Press Release	Mass media	By NCSU College of Ag and Life Sciences	Press Release - NCSU about Gregory Rain Garden Install	Gregory Rain Garden / EPA 319 grant
9/14/2007	Wilmington Star News	General public	By Gareth McGrath	Wilmington Magazine (Star News publication) - Going Green	Going Green - No. 7 Rain barrels
9/16/2007	Wilmington Star News	General public	By Gareth McGrath	Newspaper Article - Drought's Impact In Area Is Hit Or Miss	Drought, rain barrel use
12/4/2007	Wilmington Star News	General public	By Gareth McGrath	Newspaper Article - Star News Cheap Rain Barrels Can Help Save Water	Rain barrel sale
12/1/2007	Wilmington Star News	General public; environmentally conscious	By Valerie Robertson	Newspaper Article - Rain Barrels A Simple Investment In Collecting Water	Rain Barrels
1/10/2008	Lumina News	General, beach patrons	By Jules Norwood	Newspaper Article - Wilmington Seeks Public Input On Stormwater Changes	Stormwater ordinance update - public meeting
1/4/2008	Wilmington Star News	General public	By Jennifer Butler	Newspaper Public Notice Ad - SW Ordinance Revision Public Input Meeting	Stormwater ordinance change public meeting - public notice ad
1/17/2008	Lumina News	General public, beach patrons	By Sarah Howell	Newspaper Article - Barrel Sale Encourages Rainwater Harvesting	2008 Rain barrel sale
1/24/2008	Lumina News	General public, beach patrons	By Jules Norwood	Newspaper Article - Lumina News - Wilmington Works To Update Stormwater Ordinance	Stormwater ordinance update
1/25/2008	Wilmington Star News	General public	Unknown	Newspaper Article - Star News - Market Street Will Close Road To 2 Lanes	Northwoods Drainage Project
2/29/2008	Wilmington Star News	General public	By Susan Hart	Newspaper Article - Give Plants Better Water And Conserve With Rain Barrels	Rain barrels

Kiosks and signage

June 2007	Stormwater Demonstration Site	Demo site visitors	Stormwater staff	New Welcome/BMP sign for Stormwater Demonstration Site	Educational signage for park visitors
June 2007	Placed at Mary Bridgers Park, Park Avenue Bioretention Area, and for SW Display	Park visitors	Stormwater staff	3 pet waste education signs	Pet waste educations signs for community

Targeted Direct Mail

April 2007	Kelly Road area	Kelly Road residents	Stormwater Maintenance staff	Citizen Notice - notification of drainage Improvement project in Kelly Road area	115 door hangers to Kelly Road citizens
May 2007	Targeted Direct Mail	Shell Rd. Village residents	Stormwater staff	Citizen Mailing - notification of drainage improvement project	720 notices to Wrightsville Ave/Shell Rd. citizens
7/10/07	Targeted Direct Mail	Mary Bridgers Park residents	Stormwater staff	Citizen mailing - pet waste education in response to neighborhood complaints	112 notices to Mary Bridgers Park citizens
6/1/2007	Targeted Direct Mail	Pine Valley Drive residents	Stormwater staff	Citizen mailing - pet waste education in response to complaint	27 notices to Pine Valley Drive citizens
5/2/2007	Targeted Direct Mail	23rd St. residents	Stormwater staff	Citizen mailing - pet waste education in response to complaint	12 notices to 23rd St. citizens
2/1/2008	Targeted Direct Mail	Hawthorne Rd. residents	Stormwater staff	Citizen mailing - pet waste education in response to complaint	75 notices to Hawthorne Rd. citizens

Displays at Point of Purchase

Ongoing	All veterinarians in New Hanover County	Pet Owners; veterinarians	Stormwater staff NHSWCD staff	Display pet waste poster and brochures at all vet offices in New Hanover County	Partnership with New Hanover Soil & Water Conservation District to educate pet owners

Utility Bill Inserts

N/A					

Public Meetings

3/14/2007	Mary Bridgers Wetland Planning Meeting, NHHS	Local residents	Partnership with NCSU on 3196 grant project	Public input	New stormwater wetland design 25 attendees
1/17/2008	SW Ordinance Revision - public input meeting City Council Chambers	General public, contractors, design engineers	Stormwater staff Planning staff Engineering staff	Public input	Public input for meeting stormwater ordinance revision Held in City Council Chambers 35 attendees

Community Events

3/24/2007	Annual Rain Barrel Sale at Halyburton Park	General public	Stormwater Staff NHSWCD Rainwater Solutions	Annual Rain Barrel Sale to promote stormwater retention and water conservation	88 rain barrels sold Stormwater Services donates raffle for $35 off for 10 people
4/27/2007	Lower Cape Fear Earth Day Celebration at Hugh MacRae Park	Festival attendees, general public	Stormwater Staff (SWS is an annual sponsor of the Lower Cape Fear Earth Day Festival)	Display booth to promote stormwater pollution prevention	Stormwater information distributed. 4,000+ attendees

5/12/2007	Mary Bridgers Park Wetland Planting	Burnt Mill Creek Neighborhood Residents	Stormwater Staff NCSU WECO NCSU BAE Citizens	Install stormwater wetland	Neighborhood residents helped to plant new wetland
6/19/2007	Bethel Road Wetland	Elected officials, Stormwater staff, other agencies, citizens	Contracted capital project	Ceremony to commemorate new 17-acre wetland completion	50+ attendees CWMTF grant-funded project
9/8/2007	Wilmington Dog Jog	Dog owners	Parks and Recreation Dept.	250 pet waste magnets and brochures distributed	Annual event

Contest

N/A					

Storm Drain Marking

Ongoing	Campaign to place storm drain markers and educational door hangers throughout the City	City residents, businesses, landscapers	Stormwater awareness and pollution prevention	25+ storm drain markers placed throughout the City and in residential neighborhoods	SWS works with citizens, neighborhoods, school groups, UNCW, and our Code Enforcement officer to place storm drain markers

Stream & Litter Clean-ups

4/21/2007	Greenfield Lake Greenfield Street from 1300 to 1600 block including 2 vacant lots	CFRW Volunteers	This was a contract activity with Cape Fear River Watch (CFRW	Streambank / watershed cleanup	17 volunteers 51 volunteer hours 20 bags of trash collected
6/16/2007	Burnt Mill Creek	CFRW Volunteers	This was a contract activity with Cape Fear River Watch (CFRW)	Streambank / watershed cleanup	9 volunteers 27 volunteer hours 18 bags of trash collected
9/29/2007	Greenfield Lake - BIG SWEEP	CFRW Volunteers	This was a contract activity with Cape Fear River Watch (CFRW	Streambank / watershed cleanup	65 volunteers 325 volunteer hours 70 large bags of trash collected
10/29/2007	Greenfield Lake	CFRW Volunteers	This was a contract activity with Cape Fear River Watch (CFRW)	Streambank / watershed cleanup	9 volunteers 26 volunteer hours 27 large bags of trash collected
11/27/2007	Burnt Mill Creek - Kerr Avenue Wetland	CFRW Volunteers	This was a contract activity with Cape Fear River Watch (CFRW)	Streambank / watershed cleanup	14 volunteers 56 volunteer hours Invasives removal
1/14/2008	Cape Fear River	CFRW Volunteers	This was a contract activity with Cape Fear River Watch (CFRW)	Streambank / watershed cleanup	21 volunteers 63 volunteer hours 57 large bags of trash collected
2/13/2008	Smith Creek	CFRW Volunteers	This was a contract activity with Cape Fear River Watch (CFRW)	Streambank / watershed cleanup	14 volunteers 60 volunteer hours 200 lbs of glass, 55 lbs of aluminum, 3000 lbs of garbage

Group Presentations, Speeches

12/1/2007	Fishes of the Cape Fear River - focusing on the Shortnose Sturgeon	General public	Ryan Glass, NC Aquarium Educator (Contract activity with CFRW)	Slide show talk	35 attendees
2/27/2008	UNCW	Surfrider Foundation	Stormwater Staff	Enviroscape presentation	15 attendees

News Coverage

6/20/2007	TV News Coverage - WWAY	General Public	Bethel Road Stormwater Wetland	Viewing audience	Informed the public
1/14/2008	TV News Coverage - WWAY	General public	Reducing SW runoff may run down property values	Viewing audience	Informed the public
1/14/2008	TV News Coverage - WWAY	General Public	Rain Barrel Conservation	Viewing audience	Informed the public

Workshops and Classroom Outreach

3/1/2007	Noble Middle School	3 classes / 8th graders	Stormwater, NHSWCD, CFRW	Enviroscape Presentations	90 students educated
3/14/2007	Roland Grise Middle School	2 classes / 8th graders	Stormwater, NHSWCD, CFRW	Enviroscape Presentations	60 students educated
3/27/2007	Noble Middle School	2 classes / 8th graders	Stormwater, NHSWCD, CFRW	Enviroscape Presentations	60 students educated
4/25/2007	Myrtle Grove Middle School	4 classes / 8th graders	Stormwater, NHSWCD, CFRW	Enviroscape Presentations	120 students educated
4/18/2007	Myrtle Grove Middle School	4 classes / 8th graders	Stormwater, NHSWCD, CFRW	Enviroscape Presentations	120 students educated
4/26/2007	Myrtle Grove Middle School	2 classes / 8th graders	Stormwater, NHSWCD, CFRW	Enviroscape Presentations	60 students educated
5/9/2007	Myrtle Grove Middle School	4 classes / 8th graders	Stormwater, NHSWCD, CFRW	Enviroscape Presentations	120 students educated
5/15/2007	Myrtle Grove Middle School	4 classes / 8th graders	Stormwater, NHSWCD, CFRW	Enviroscape Presentations	120 students educated
5/22/2007	Myrtle Grove Middle School	4 classes / 8th graders	Stormwater, NHSWCD, CFRW	Enviroscape Presentations	120 students educated
10/5/2007	CFCI Charter School	2 classes / 8th graders	Stormwater, NHSWCD, CFRW	Enviroscape Presentations	40 students educated
10/15/2007	Murray Middle School	4 classes / 8th graders	Stormwater, NHSWCD, CFRW	Enviroscape Presentations	120 students educated
10/15/2007	Murray Middle School	4 classes / 8th graders	Stormwater, NHSWCD, CFRW	Enviroscape Presentations	120 students educated
10/22/2007	Virgo Middle School	5 classes / 8th graders	Stormwater, NHSWCD, CFRW	Enviroscape Presentations	150 students educated
10/24/2007	Murray Middle School	3 classes / 8th graders	Stormwater, NHSWCD, CFRW	Enviroscape Presentations	90 students educated
11/7/2007	Williston Middle School	3 classes / 8th graders	Stormwater, NHSWCD, CFRW	Enviroscape Presentations	90 students educated
11/7/2007	Williston Middle School	3 classes / 8th graders	Stormwater, NHSWCD, CFRW	Enviroscape Presentations	90 students educated
11/7/2007	Williston Middle School	4 classes / 8th graders	Stormwater, NHSWCD, CFRW	Enviroscape Presentations	120 students educated

Distributing promos giveaways

5/1/2007	WGNI Beach Bag Giveaway	Radio listeners	Cumulus/102.7 FM radio staff	Beach bag giveaway with 500 stormwater education magnets distributed	Media partnership
Ongoing	Everywhere	General public	Stormwater staff	Leave promo items in strategic locations	Citizens are able to pick-up promo items

Brochures, Displays, Signs, Welcome Packets, Pamphlets

4/27/2007	Lower Cape Fear Earth Day Celebration at Hugh MacRae Park	Festival Attendees, General Public	Stormwater staff (SWS is an annual sponsor of Earth Day Festival)	Display booth to promote Stormwater Pollution Prevention	Stormwater information distributed. 4,000+ attendees
11/29/2007	Stewardship Development Banquet	Realtors, Developers, Environmental Groups	Stormwater Awareness	Direct contact with attendees	Stormwater information distributed. 250 attendees

Local Cable Access

Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	5 minute mini-documentary	Amazing Oyster (Sea Grant NC) - intro
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	:30 second PSA	Ashtray/Litter PSA
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	30 minute documentary	Best Management Practices
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	:30 second PSA	Car Wash PSA
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	:30 second PSA	Cigarette Butts PSA - birds (KAB)
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	:30 second PSA	Cigarette Butts PSA - gunfighters
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	:30 second PSA	Fertilizer PSA UNCW
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	:30 second PSA	Fish PSA - NC DENR
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	:30 second PSA	Illicit Discharge PSA
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	:30 second PSA	Keep America Beautiful PSA
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	:30 second PSA	Pet Waste PSA UNCW 2006
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	:30 second PSA	Pet Waste PSA UNCW pigs

Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	:30 second PSA	SW Raincoat Girl PSA
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	Narrated slide show	Stormwater 101: Pesticides
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	Narrated slide show	Stormwater 101 : Pet Waste
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	Narrated slide show	Stormwater 101 : The Basics
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	Narrated slide show	Yard Waste video
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	Narrated slide show	General public
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	Narrated slide show	General public
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	Slide show	General public
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	Narrated slide show	General public

Newsletters

Winter/ Spring 2007	Stormwater Watch Newsletter	Stormwater Database, Public Library	Stormwater staff	1,200+ distributed	UNCW Water Quality Report Issue, Earth Day event, rain barrel sale
Summer 2007	Stormwater Watch Newsletter	Stormwater Database (1000 recipients), Public Library	Stormwater staff	1,200+ mailed or strategically placed	Bethel/Mary Bridgers Wetlands, manual ditching crew, water conservation, car washing
Fall 2007	Stormwater Watch Newsletter	Database; General Public; Main Library	Stormwater staff	1,200+ mailed or strategically placed	Annual Report Issue - Street sweeping crew, In-House Projects, maintenance chart, Capital Projects Map, SW 101: Cigarette Butts

Citizen Contacts

Ongoing	Stormwater Office via phone or email	Citizen	Stormwater staff	Email or phone responses to requests for information, literature, etc.	Information provided to 46 citizens/businesses

Weekly Update Articles for City Council / Media / City Staff

Weekly	Email	City Council, media, City employees	City staff	Weekly update of events, news, projects, etc.	Stormwater information was included in 21 issues

Identification of Target Pollutants, Sources and Target Audiences

The following pollutants have been identified as significant sources of pollution in our waterways. Many of these pollutants also negatively impact the proper function of the storm drainage system. Therefore, the following pollutants are the focus of our outreach and education program:

Target Pollutant	**Source of Pollutant**	**Target Audience(s)**
Bacteria, viruses, parasites, and nutrients	Pet Waste	-Pet owners -Pet industry professionals -General public
Nutrients such as nitrogen and phosphorous	Fertilizer	-Homeowners/residents -Landscape/Turf Maintenance Professionals -General public
Toxic chemicals including herbicides, fungicides, and insecticides	Pesticides	-Homeowners/residents -Landscapers -Pest Control Applicators -General public
Organic materials including leaves, grass clippings, pine straw, sticks, limbs, and other yard trimmings	Yard Waste and Debris	-Homeowners/residents -Landscape/Turf Maintenance Professionals -General public
Sand, dirt, gravel, clay, soil, etc.	Sediment	-Homeowners/residents -Businesses -Construction/developers -Landscape/Turf Maintenance Professionals -General public
Plastics, paper, cigarette butts, etc.	Litter	-Smokers -Youth -General public
Motor oil, antifreeze, grease, gas, and other vehicle fluids	Auto Fluids	-Do-it-yourself oil changers -Vehicle owners -Vehicle maintenance & repair shops -General public
Carwashing detergents, soaps, grime	Car Washing Soaps	-Homeowners/residents -General public

Target Pollutant: Pet Waste
Pet waste includes a host of bacteria, pathogens, and nutrients that contribute to surface water pollution and human health risks.

Target Pollutant Source
Animal waste is generated from the natural biological processes of domesticated and wild animals. Although waste from wild animals contributes to pollutant levels in our waters, the focus of our efforts are to inform the public of the problems and solutions associated with waste from domesticated pets.

Problems & Issues
According to 2006 data provided by New Hanover County Animal Control Services, there were 53,630 registered dogs and cats in New Hanover County (33,828 registered dogs and 19,802 registered cats). In addition, it is estimated that there are 5 unregistered pets for every 1 registered pet.

These numbers, in conjunction with the average defecation rate of pets, are a significant source of bacterial pollution draining to our area waterways. Canines produce an average of ¾ lb of waste per day; applying that rate to the number of dogs registered in New Hanover County in 2006 equates to 25,371 pounds of excrement produced daily by canines in New Hanover County. If we consider the estimated number of unregistered dogs, that figure climbs significantly.

Stormwater contamination from pet waste poses serious health risks for humans. When pet waste is left on the ground, stormwater runoff can carry viruses, bacteria, and parasites from pet waste into local surface waters via the stormwater drainage system. Humans can become ill by swimming or recreating in waters contaminated by pet waste, eating shellfish from contaminated waters, coming in direct contact with pet waste, or from flies which spread diseases. Wilmington's creeks and waterways are regularly monitored by UNCW Center for Marine Science Research staff, and surface waters in the Wilmington area consistently exceed the state standards for fecal coliform counts in human contact waters as set by NC DEHNR (Mallin et. al). High fecal coliform counts in Wilmington's waterways are a direct result of pet waste contaminated stormwater runoff. The health risks to humans associated with the bacteria and parasites polluting surface water from pet-waste contaminated stormwater runoff make education and outreach on pet waste a top priority.

Several diseases that humans can contract from pathogens in pet waste include:

- ***Toxoplasmosis*** - Toxoplasmosis is a parasitic disease caused by the protozoan *Toxoiplasma gondii* and infects most warm-blooded animals including humans. The primary host is the felid (cat) family. Humans can contract the disease by ingestion of infected animal (especially cat) feces through hand-to-mouth contact following activities that involve touching anything that has come into contact with animal feces such as gardening, cleaning a litterbox, etc. Humans can also contract the disease by ingestion of water contaminated with Toxoplasma, such as contact recreation in water

contaminated with the Toxoplasma. A person suffering from acute toxoplasmosis show flu-like symptoms, swollen lymph nodes, or muscle aches and pain that lasts for a month or more. Young children, elderly people, pregnant women, and immunocompromised patients, such as those with HIV/AIDS, are especially susceptible to toxoplasmosis. Severe toxoplasmosis can cause damage to the brain or the eyes and birth defects in newborns ("Toxoplasmosis: Fact Sheet" CDC Division of Parasitic Diseases).

- ***E. Coli*** - Escherichia coli (E. coli) are one of the main species of bacteria living in the lower intestines of mammals such as dogs and cats. Humans can contract E. coli through ingestion of water contaminated with the bacteria through drinking or contact recreation. People generally become ill from E. coli two to eight days after being exposed to the bacteria, and infection often causes severe bloody diarrhea and abdominal cramps; complications from severe E. coli infection can lead to death. In some people, E. coli infection can cause a complication called hemolytic uremic syndrome (HUS), a life-threatening condition that is usually treated in an intensive care unit through blood transfusions and kidney dialysis. A small percentage of persons with HUS have immediate complications with lifelong implications such as blindness, paralysis, persistent kidney failure, and mild abnormalities in kidney function ("Disease Listing, Escherichia Coli O157:H7, General Information" CDC Division of Bacterial and Mycotic Diseases).

- ***Salmonella*** - Salmonellosis is an infection of the intestines caused by Salmonella bacteria, which are found in the feces of people and animals infected with Salmonella. Humans can contract Salmonella infections through contact with infected animals or their feces, including contact recreation or drinking water contaminated with the bacteria. Salmonella in humans can cause diarrhea, stomach pain, nausea and vomiting, and fever and headache, usually within 6 to 72 hours after exposure to Salmonella ("Disease Listing, Salmonellosis, General Information" CDC Division of Bacterial and Mycotic Diseases).

- ***Gastroenteritis*** - Gastroenteritis is a general term referring to inflammation or infection of the gastrointestinal tract, primarily the stomach and intestines. Gastroenteritis is the most common illness associated with swimming in water polluted by sewage and/or pet waste, and it occurs in a variety of forms that can have one or more of the following symptoms: nausea, vomiting, stomach ache, diarrhea, headache, and fever ("Viral Gastroenteritis" Center for Disease Control and Prevention, Respiratory and Enteric Virus Branch.).

- ***Roundworm*** - Roundworms, or nematodes, are a group of invertebrates whose larvae can be found in animal feces. Human can contract roundworm infections either by ingestion or through the skin ("Toxocariasis: Fact Sheet" CDC Division of Parasitic Diseases).

  Some of the most common parasitic roundworms that can be transmitted to humans are:

- *Enterobius vermicularis*, the pinworm that causes **enterobiasis**
- *Ascaris lumbricoides*, the large intestinal roundworm that causes **ascariasis**
- *Necator* and *Ancylostoma*, two types of hookworms that cause **ancylostomiasis**
- *Trichuris trichiura*, the whipworm that causes **trichuriasis**
- *Strongyloides stercoralis* that causes **strongyloidiasis**
- *Trichinella spiralis* that causes **trichinosis**

Pet waste also seriously impacts a waterway by contributing nutrients that spur excessive weed and algae growth. When algal biomass decomposes, it consumes large amounts of dissolved oxygen (DO) from the water that can lead to dangerously low dissolved oxygen levels and fish kills. This nutrient-rich water impairs aquatic habitat and is unattractive and unhealthy for drinking, swimming, fishing, and other recreational activities.

Target Audience
Based on the results of the 2005 Survey of North Carolina residents' stormwater behaviors and the City of Wilmington demographics, it was determined that education and outreach efforts should target the following audiences *(Note: A target audience is subject to modification over time pending results of periodic assessment and evaluation):*

1. Pet Owners
   Pet owners are considered the primary focus for outreach and education. By right of ownership, a pet owner is empowered with the ability to reduce pet waste-contaminated stormwater runoff by cleaning up after his/her pet. Successful and continued education and outreach to pet owners has the potential to significantly reduce bacterial pollution and eutrophication of Wilmington's waterways.

   Pet owners offer a variety of reasons for not picking up after their pets, including:
   - Not wanting to touch it
   - Thinking of it as fertilizer
   - Believing it will decompose quickly and go back into the soil
   - Being unaware of the health risks
   - Feeling it is their private property and therefore can do whatever they wish

   The habit of NC pet owners cleaning up after their pets reflects these attitudes. Significantly more than half of each demographic (age, sex) in the survey responded to picking up after their pet as "Sometimes," "Rarely," or "Never" (Bartlett C-51). This data leads to the conclusion that the primary target audience for education and outreach should be broad initially, and adjusted to target more specific demographics pending the results of assessment and evaluation of education efforts.
   - 18 to 64 year olds: Based on the survey results, the target audience's age is very broad. Pet owners aged 65 and older exhibit slightly better waste clean-up habits; the survey did not include pet owners under the age of 18.

- Males and Females: Females were reported as having slightly better pet waste clean-up habits than males, but significantly more than half of each group still reported cleaning up after their pet as "Sometimes," "Rarely," or "Never."

2. Pet Industry Professionals/Businesses/Events
   Education and outreach to pet industry professionals is extremely important because of their regular contact with pet owners. Targeting businesses, professionals, and events that cater to pet owners will enable us to educate those in the profession as well as have them serve as a conduit to deliver education and outreach messages. Businesses, professionals, and events that should be targeted include:
   - Veterinarians
   - Animal hospitals
   - Pet sitters
   - Doggie day cares
   - Pet trainers
   - Pet exercisers
   - Kennels and animal shelters
   - Groomers and pet spas
   - Pet supply stores
   - Pet magazines
   - Dog Jog, Paw Jam and other special events for pets
   - Local adoption agencies
   - Animal Control & the Humane Society

3. General Audience
   By targeting a general audience for education and outreach efforts, we will be able to encourage more environmental stewardship of citizens in the community. Both pet owners as well as non-pet owners will understand the connection between pet waste and poor water quality, and as a result more pet owners will feel obligated to clean up after their pet as they will feel pressure from other citizens to do so. As more citizens are aware of the health consequences as well as the impacts to Wilmington's waterways, the more likely they are to report pet waste violators, or interject when witnessing a pet waste violation.

Key Messages for Pet Waste Education

- Uncollected pet waste pollutes Wilmington's waterways and threatens public health.
- Bacteria in pet waste can cause diseases and infections in humans and other animals.
- Bacteria and nutrients in pet waste can cause serious water quality problems.
- Pet owners/custodians should always clean up and properly dispose of pet waste by methods such as bagging, burying waste, using a pet waste digester, using a covered litterbox, etc.
- Pet waste should not be flushed down the toilet in New Hanover County.

Message Distribution

- Distribute pet waste education brochures through all veterinarian offices in New Hanover County.

- Add more pet waste educational signs to the pet waste stations in City Parks.
- Revise pet waste ordinance and require pet owners to pick up after their pet on public property. Include a clause that requires pet owners to show they have something on their person to do so (i.e. bag, scooper, etc).
- Mail a pet waste education brochure to all registered pet owners in New Hanover County.
- Using male-oriented media, target males, ages 18-64 through a mass media campaign for pet waste.
- Establish contact with pet industry professionals and businesses to disseminate pet waste education messages, such as mailing them informational and educational materials, giving presentations at their businesses or community events, meeting with them and highlighting education outreach materials, etc.
- Participate annually in the Wilmington Dog Jog event and Paw Jam event to disseminate pet waste messages.
- Include blurbs in the citywide newsletter mailed quarterly to all citizens.
- Contact local media outlets to suggest feature stories and/or articles regarding the importance of proper pet waste disposal
- Develop and distribute public service announcements on pet waste on cable access and paid media as the budget permits

Assessment and Evaluation

- Periodically assess the habits of pet owners and pet industry professionals by:
  - Direct observation of habits *(collects vs. doesn't collect, where dispose, etc.)*
  - Count of citations issued for pet waste violations
  - Count of reported complaints to Stormwater Hotline regarding pet waste violations
- Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting, specifically Fecal Coliform counts in local waters

Target Pollutant: Fertilizer
The nutrients found in fertilizer, including phosphorous and nitrogen, cause algal blooms, and lead to low dissolved oxygen levels in surface waters, and cause aquatic habitat degradation.

Target Pollutant Source
Fertilizers are substances spread on or worked into soil to increase its capacity to support plant growth. Fertilizers can be composed of organic and inorganic chemicals and compounds, and typically provide, in varying proportions, three major plant nutrients: nitrogen, phosphorous, and potassium. Sources of fertilizers include residential and commercial applications, applied by a wide variety of people ranging from the novice homeowner and gardener to professionally-trained landscapers and turf maintenance workers. Although not typically found in the City of Wilmington, another major source of fertilizer application is the farming of crops.

Problems & Issues
Proper application of fertilizer results in minimal environmental concerns, however negligent or improper application of fertilizers results in the introduction of nutrients and chemicals into local waterways via stormwater runoff. Improper application includes over-applying by frequency or volume, applying the wrong fertilizer compound, applying before rain, and failure to clean excess fertilizer from driveways and streets after application.

The chemicals and nutrients in fertilizers wash into surface waters during rain events or irrigation practices and result in eutrophication, which is the abundant accumulation of nutrients that support a dense growth of algae and other organisms. Decaying algae depletes dissolved oxygen from the water, resulting in a decrease of available oxygen for aquatic inhabitants like fish. This leads to a decline in aquatic organism populations from oxygen deprivation, or hypoxia.

Harmful algal blooms also prevent sunlight from penetrating surface waters, making it difficult for benthic, or bottom dwelling plants, to perform photosynthesis, which also further reducing the oxygen content of the water. Some algal blooms can be toxic to plant and animals, including humans.

Target Audience
The target audience for fertilizer education and outreach includes homeowners, business owners, and landscape and turf maintenance professionals. Generally, trained landscape business professionals have had some training and special knowledge on proper fertilization measures, however continuing education for alternatives to fertilizer application and frequent over-application is still very necessary for this sector. Homeowner education should be a top priority.

1. Homeowners
   About 5% of residents who apply fertilizer to their yard apply it monthly. The majority of responses to "monthly" were of the highest income level of the survey respondents. The

most responses to applying fertilizer 2-3 times per year were from the two highest income brackets in the survey (Bartlett 14).

Male homeowners who spend less than $500 per year on lawn care are the group that applies the most fertilizer themselves and not by hiring a professional service. Those who spend more tend to hire a professional service ("Toolbox – Audience Data").

2. Landscape and Turf Maintenance Professionals
   Professionals employed in landscaping and turf maintenance should be a target audience due to their frequent use of fertilizers.

Key Messages for Fertilizer Education

- There is a direct link between improper fertilizer application and poor water quality impacts, including fish kills, habitat destruction, and water quality degradation.
- Promote time and money-saving alternatives to traditional fertilizer application including "grasscycling" (leaving grass clippings on the lawn as a natural fertilizer and soil conditioner), composting, using organic fertilizers, and getting a free soil test to determine the correct nutrient needs of a lawn and the proper application rates.
- If you use fertilizer, read the label and apply correctly (i.e. not before it rains).
- Fertilizer should be collected off of paved surfaces such as sidewalks and driveways.
- Yard waste is also a source of nutrients because of the fertilizer attached and the nature of the organic matter, so yard waste should always be disposed of properly.
- Citizens should employ a sense of responsibility and environmental stewardship to apply fertilizer properly.

Message Distribution

- Distribute fertilizer education brochures to all yard maintenance and turf management businesses in New Hanover County.
- Mail a fertilizer education brochure to all City of Wilmington residents.
- Include blurbs in the citywide newsletter mailed quarterly to all Wilmington citizens.
- Establish contact with local homeowners associations to disseminate fertilizer education messages through mailings, newsletters, presentations, and meetings, etc.
- Establish contact with yard maintenance and turf management businesses to disseminate fertilizer education messages and encourage and ensure proper staff training.
- Establish contact with management staffs of the golf courses in New Hanover County to disseminate fertilizer education messages and ensure proper staff training.
- Contact local media outlets to suggest feature stories and/or articles regarding the importance of proper fertilizer application.
- Develop and distribute public service announcements on the importance of proper fertilizer application.

Assessment and Evaluation

- Periodically assess the habits of homeowners and landscape industry professionals by:
  - Direct observation of the fertilizer application habits of homeowners and landscape industry professionals in the Wilmington area

  - Surveys of the fertilizer application habits of homeowners and landscape industry professionals in the Wilmington area
- Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting, specifically nitrogen, phosphorus, BOD, and algal bloom frequencies and locations

Target Pollutant: Pesticides
Pesticides include herbicides, fungicides, and insecticides that contain toxic chemicals.

Target Pollutant Source
Pesticides are applied by homeowners, business owners, landscape and turf maintenance professionals, and exterminators and pest control professionals.

As defined by the Environmental Protection Agency (EPA), a pesticide is "any substance or mixture of substances intended for preventing, destroying, repelling, or lessening the damage of any pest." Sources of pesticides include applications to homes and businesses by homeowners, business owners, or commercial pesticide professionals. Agricultural application of pesticides is not considered a source in Wilmington because of the absence of agricultural operations in the area.

Problems & Issues
Commonly used organophosphate pesticides are present in urban stormwater runoff and are responsible for toxicity to aquatic life in receiving water bodies.

Target Audience
1. Homeowners and Residents
   A majority of the target pollutant pesticides are commonly available from home improvement and gardening stores and do not require training or licensing as a prerequisite to purchase or application. Thus, home and residential applications by citizens potentially contributes to the contamination of stormwater and surface water from pesticides. Education and outreach to Wilmington's residents on the proper application techniques and practices for pesticides would potentially reduce improper application, and thus reducing the potential for contamination of stormwater runoff. Owners or operators of small businesses that perform their own landscape maintenance should be addressed in this target audience group also.

2. Yard Maintenance, Turf Management, Exterminator/Pest Control Professionals
   It can be assumed that professionals in this industry have been properly trained and educated in application practices for pesticides and thus this group is the second tier priority target audience. However, due to the frequency of applications by members of this target audience group, the potential for contamination of stormwater runoff by pesticides through improper application by members of this target audience group is still present. Consequently, education and outreach on proper application techniques to this target audience group is needed.

Key Outreach and Education Messages for Pesticides
- Awareness of the impact of pesticides on surface waters via stormwater runoff.
- A direct link exists between animal and habitat impacts and the application of pesticides.
- Citizens/landscapers should be encouraged to use native plants which don't require pesticides, use natural controls such as ladybugs and weeding by hand, using organic

pesticides, reading the label to apply correctly (i.e. not before it rains) and using pesticides as a last resort.
- Citizens should employ a sense of responsibility and environmental stewardship to apply pesticides properly.

Message Distribution
- Establish contact with yard maintenance, turf management, and exterminator/pest control professionals in New Hanover County to disseminate pesticide education messages and encourage and ensure proper staff training.
- Distribute pesticide education brochures to all yard maintenance, turf management, exterminators, and pest control professionals in New Hanover County.
- Establish contact with local homeowners association and property management companies to disseminate pesticide education messages.
- Mail a pesticide education brochure to all Wilmington residents.
- Include blurbs in the citywide newsletter mailed quarterly to all Wilmington citizens.
- Work with NC Cooperative Extension Service to implement educational workshops focused on proper pesticide use for professionals needing NC Pesticide credits.
- Contact local media outlets to suggest feature stores and/or articles regarding the importance of proper pesticide application.
- Develop and distribute a public service announcement on the importance of proper pesticide application.

Assessment and Evaluation
- Periodically assess the pesticide application habits of homeowners, yard maintenance, turf management, and exterminator/pest control professionals by:
  - Direct observation pesticide application habits of homeowners, yard maintenance, turf management, and exterminator/pest control professionals
  - Surveys of pesticide application habits of homeowners, yard maintenance, turf management, and exterminator/pest control professionals
- Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting, specifically nitrogen, phosphorus, BOD, and algal bloom frequencies and locations

Target Pollutant: Yard Waste

Yard waste includes organic, vegetative material such as grass clippings, leaves, pine straw, weeds and branches. Sediment is often attached to this matter.

Target Pollutant Source

Yard waste is produced as a result of landscaping, mowing, clipping, pruning, and gardening around homes and businesses. Yard waste consists of organic matter such as grass clippings, leaves, and branches, etc., and is produced by landscape maintenance performed by homeowners and commercial landscapers.

Problems & Issues

Yard waste can clog the storm drainage system causing flooding of streets, homes and businesses.

Yard waste that ends up traveling all the way through the drainage system ends up in local surface waters, which impacts aquatic life and habitat by introducing excess nitrogen and phosphorus to the water. This overabundance of nutrients is called eutrophication and can lead to severe algal blooms. As the algal blooms decompose, it uses up the dissolved oxygen in the water that aquatic organisms, like fish, need to survive. In addition, yard waste often carries fertilizers, pesticides, and sediment attached to it that compounds the problem of eutrophication and threatens the flora and fauna in our waterways.

Target Audience

96% of North Carolina residents surveyed reported having a yard that they personally mow. 95% of urban respondents to the survey reported either leaving their grass clippings on their lawn, collecting them and throwing them in the garbage, or using them for mulch and/or compost. Less than 2% of urban respondents reported as to blowing or raking their yard waste down the storm drain. Reponses to the survey were broken down by education level, with the largest percentages as 'High School Graduates' and 'Some College' (Bartlett, C-21).

1. Lawn Maintenance and Landscape Industry Professionals
   Since lawn maintenance professionals are more frequent to generate yard waste than the average home owner, they are potentially a greater contributor to the introduction of yard waste into the storm drainage system.

2. Homeowners
   Based on survey results, as well as the fairly even distribution of respondents by education level who reported to rake or blow their yard waste down the storm drains, the target audience should be a broad, encompassing audience. A slight priority may be given to high school and college aged audience. Based on the survey results, audience members with experience in a vocational or technical school should be given the lowest priority.

Key Outreach and Education Messages for Yard Waste

- A direct link exists between fish kills and aquatic habitat destruction as a result of improper yard waste disposal habits.

- A direct link exists between flooding of streets and property as a result of improper yard waste disposal habits.
- Landscapers/citizens should practice proper disposal methods such as grasscycling, composting, collecting/containing yard waste for pick-up and not blowing or placing debris into any part of the storm drainage system.
- Citizens should employ a sense of responsibility and environmental stewardship to dispose of yard waste properly.

Message Distribution

- Establish contact with yard maintenance and turf management professionals in New Hanover County to disseminate yard waste education messages and encourage and ensure proper staff training.
- Distribute yard waste educational brochures to all yard maintenance, turf management, and property management professionals in New Hanover County.
- Establish contact with local homeowners association and property management companies to disseminate yard waste education messages.
- Mail a yard waste educational brochure to all Wilmington residents.
- Include blurbs in the citywide newsletter mailed quarterly to all citizens.
- Contact local media outlets to suggest feature stories and/or articles regarding the importance of proper yard waste disposal habits.

Assessment and Evaluation

- Elicit counts of Stormwater Maintenance Department responses to clogged stormwater system components as a result of yard waste
- Periodically assess the yard waste disposal habits of property owners and landscape/maintenance industry professionals in Wilmington by:
  - Direct observation of habits
  - Surveys of habits
  - Count of citations issued pertaining to improper yard waste disposal habits
  - Count of reported violations to Stormwater Hotline
- Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting, specifically nitrogen, phosphorus, BOD, and algal bloom frequencies and locations

Target Pollutant: Sediment
Sediment includes particles of sand, dust, dirt, gravel and soil.

Target Pollutant Source
Sediment is generated by the processes of natural or accelerated erosion. Natural erosion is the process of weathering that forms soil. Accelerated erosion is a result of land-disturbing activities by humans that loosens topsoil and makes it more prone to erode; construction-related activities are an example of accelerated erosion. Another example is an eroding stream bank caused by lack of a vegetated buffer.

While natural erosion contributes sediment to our waterways, the majority of the sediment comes from areas where accelerated erosion has occurred. Other smaller scale sources of sediment include poorly vegetated areas in yards of homes and businesses.

Problems & Issues
Sedimentation occurs when stormwater runoff carries soil particles from an area, such as a construction site, and transports them to surface waters such as a stream or creek. Sediment can fill in a waterbody or clog the storm drainage system, which can lead to flooding of streets and property.

Excessive sedimentation clouds the water, a condition known as turbidity. Increased turbidity causes problems for aquatic plants and animals. Aquatic plants, like all other plants, require sunlight to perform photosynthesis. As water turbidity increases, the amount of sunlight able to penetrate through the water column decreases. This reduces the amount of sunlight that reaches aquatic plants, and therefore impairing plants' abilities to photosynthesize. Turbid water impairs the vision of animals, like fish, and their ability to hunt prey. Sediment in the water also impairs the ability of fish and other animals to breathe because sediment can clog their gills.

As sediment in water settles, it covers the benthic (bottom-dwelling) environment. Settling sediment smothers fish eggs, shellfish, coral, and benthic plants.

Sediment also serves as a vehicle for other pollutants like phosphorus, pathogens, and heavy metals to enter the aquatic environment. These other pollutants are often attached to sediment that ends up in surface waters, and as a result, cause their own myriad of problems to the environment.

Target Audience
Sources of sediment in our surface waters are primarily the result of accelerated erosion or erosion from any land-disturbing activity such as gardening, planting, construction, etc. The environmental consequences of sedimentation of surface waters are not widely understood by citizens, and an effective education and outreach campaign should convey the key messages to a wide target audience.

1. Homeowners and Business Owners
   A broad audience should be blanketed by education and outreach efforts. Addressing citizens and businesses that only have bare spots in their yards is unfeasible and impracticable, and therefore the efforts for education and outreach should be as far-extending as possible, relaying the key messages in a package rather than tailoring key messages to specific target audience groups. These messages should also target homeowners that live along water conveyances that have significant erosion due to lack of a vegetated buffer to stabilize the bank.

2. Construction, Landscape, and Related Business Professionals
   Due to the high amount of construction and development in Wilmington, a second-tier target audience group should be addressed that includes construction, landscape, and related industry professionals. The activities executed by members of these industries have very high potential to significantly contribute to sediment loading of stormwater runoff. Sediment and erosion control techniques are generally legally required when performing construction and landscape activities, and targeting this group with education and outreach on the environmental and legal importance of these methods can prevent a potentially large amount of sediment from being carried off by stormwater runoff.

Key Outreach and Education Messages for Sediment

- A direct link exists between sediment and poor water quality.
- Sedimentation impacts aquatic life and habitat.
- Citizens can plant groundcover, shrubs, and trees to hold soil in place and reduce erosion.
- Sediment should be collected off streets, driveways and other hard surfaces.
- Developers should follow all sedimentation and construction site laws and practices.
- Citizens and businesses should employ a sense of responsibility and environmental stewardship to contain and control sources of sediment.

Message Distribution

- Promote the NC Division of Land Resources "1-866-STOP-MUD" toll free hotline to report possible violations of the Sedimentation Pollution Control Act.
- Establish contact with construction, landscaping, and related business professionals in New Hanover County to disseminate sediment education messages and encourage and ensure proper staff training.
- Distribute sediment educational brochures to all construction, landscaping, and related business professionals in New Hanover County.
- Establish contact with local home owners associations and property management companies to disseminate sediment education messages.
- Include blurbs in the citywide newsletter mailed quarterly to all citizens.
- Contact local media outlets to suggest feature stories and/or articles regarding the problems caused by sediment entering the stormwater drainage system.

Assessment and Evaluation

- Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting, specifically Total Suspended Solids (TSS)

Target Pollutant: Litter
Litter includes plastics, paper, cigarette butts, and any other trash not properly disposed of.

Target Pollutant Source
Litter is generated as a result of the intentional or unintentional disposal of trash, cigarette butts, paper scraps, food wrappers, etc. onto the open ground or anywhere other than a trash can, dumpster, or recycling bin.

Problems & Issues
Litter is carried by stormwater runoff into the drainage system where it can clog storm drains and drainage routes and cause flooding onto streets and property.

Litter that travels all the way through the drainage system ends up in local surface waters where it causes many problems:

- Fish, birds and other wildlife often mistake litter for food and become sick or die from ingesting it.
- Fish, birds and other wildlife become entangled in litter and perish because they become strangled or are not able to properly ingest their food.
- Litter can introduce chemical pollutants into waterways. Cigarette butts can leach chemicals such as cadmium, lead, and arsenic into the marine environment within one hour of contact with water.
- Litter is extremely costly to clean up, yet very easy to prevent. The North Carolina Department of Transportation alone spent $16 million in 2006 cleaning up roadside litter.

Target Audience
Although no surveys has been performed in Wilmington or North Carolina targeting the litter habits of citizens, other research can be considered applicable in defining the target audience. Based on an inquiry to the North Carolina Administrative Office of the Courts, a summary of the littering offenses for calendar year 2006 showed that there were 218 littering charges including six offense codes, with 81 convictions. The majority of the offenses were: *Littering not more than 15 pounds* (132) and *Improper Loading/Covering of Vehicle* (69) ("Litter Data").

Research on litter habits of Victoria, Australia citizens has shown that men litter more than women, students are more likely to litter than other people, most littering occurs in transport sites, smoking areas and market sites, and the most common reasons for littering are: "too lazy" (24%), " no ashtray" (23%), and "no bin" (21%) ("VLAA – Facts About Butt Litter"). Finally, an abundance of research has shown that cigarettes are the largest source of litter. The public education and outreach for litter should target the following audiences:

1. <u>General, Encompassing Audience</u>
   Despite several surveys and research, there is no such thing as a stereotypical litterbug. Litter habits cannot be confined to a particular demographic, and therefore education and outreach efforts should extend to every citizen in Wilmington.

2. Smokers
   Cigarette butts are the largest environmental litter problem both locally and worldwide. Smokers should be educated that cigarette butts are a major source of litter and that they negatively impact the environment.

3. Drivers of Pickup Trucks and/or Open Trailers
   A lot of roadside litter in North Carolina results from poor securing of cargo loads. Drivers that may be transporting loads of debris, yard waste, trash, etc often do not secure their loads in their truck beds or open trailers and then the load gets blown off of the vehicle and onto the roads and surrounding areas *(Keep It In Your Bed…).*

Key Outreach and Education Messages for Litter

- A direct link exists between animal kills, habitat destruction, and water quality degradation as a result of littering.
- There is a direct link between flooding of streets/property as a result of litter being carried by stormwater into the drainage system.
- Messages should encourage the use of trash bins and reducing, reusing, and recycling.
- Messages should include the specific impacts of litter on local waterways and inhabitants (i.e. plastic bags get mistaken as jellyfish by sea turtles) and litter decomposition rates to raise awareness of the longevity of litter in our environment.
- Citizens should employ a sense of responsibility and environmental stewardship to dispose of yard waste properly to dispose of litter properly and encourage the reporting of litter violators and the enforcement of litter offenses.

Message Distribution

- Distribute pocket ashtrays to residents of New Hanover County to encourage proper cigarette butt disposal.
- Work with Keep America Beautiful of New Hanover County to develop and implement a public service campaign for litter education and outreach.
- Develop and distribute posters to disseminate litter education and outreach messages
- Distribute educational giveaways (i.e. pencils) about littering to students in New Hanover County.
- Include blurbs in the citywide newsletter mailed quarterly to all citizens.
- Educate citizens and students about using North Carolina's Swat-A-Litterbug program.
- Establish contact with local sanitary disposal services to disseminate messages on proper load securing.
- Contact local media outlets to suggest feature stories and/or articles regarding problems caused by litter entering the stormwater drainage system
- Working with other local agencies, conduct volunteer litter clean-ups.

Assessment and Evaluation

- Elicit count of Stormwater Maintenance Department responses to clogged stormwater sewer system components as a result of litter.
- Have Stormwater Maintenance crews continually provide field observations of problem litter areas for clean-up by KAB community service workers or Cape Fear River Watch.
- Periodically assess the litter disposal habits of Wilmington residents by:

  - Direct observation of habits
  - Surveys of habits
  - Count of citations issued pertaining to improper litter disposal habits
  - Count of reported violations to Stormwater Hotline
  - Count of reported violations to Keep America Beautiful of NHC
  - Count of reported violations to Swat-a-Litterbug from New Hanover county
- Water quality levels, specifically litter quantities observed
- Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting

Target Pollutant: Auto Fluids
Chemicals include gas, motor oil, gear oil, grease, antifreeze, cooking oils and greases, etc.

Target Pollutant Source
Vehicle fluids and chemical pollutants can come from intentional or unintentional disposal of fluids such as motor oil, antifreeze, grease, gas, and other vehicle fluids. Sources of these fluids are leaking vehicles or machinery, leaking oil containment devices, industrial facilities, vehicle and machinery repair facilities, storage areas (including marinas), fuel stations, parking lots, and improper disposal of chemicals by homeowners or businesses, such as the do-it-yourself homeowner.

Problems & Issues
The types and sources of this pollutant class vary considerably. As of April 2, 2007, there were 178,091 registered vehicles in New Hanover County and 83,087 within the City of Wilmington limits (Cochran, D.).

Vehicles have seals and gaskets that are leaking or have the potential to leak a variety of fluids. An accumulation of oil and grease on roadways and parking lots gets carried away by stormwater runoff. Once in water, it forms a film and makes oxygen transfer difficult and toxic for aquatic animals and plants. In fact, 1 quart of motor oil can contaminate 250,000 gallons of water.

Chemicals can also enter surface waters by accumulating on sediment that is picked up by runoff. In this case, the sediment eventually settles to the bottom of the water column and adversely affects benthic organisms.

Target Audience
1. Do-It-Yourself Oil Changer
   Citizens who perform maintenance on their own vehicles should be given a high priority for education and outreach efforts based on the potential for improper disposal methods. Only about a fifth of respondents who reported owning a vehicle also reported servicing the vehicle at home; the remainder of the respondents reported using a commercial oil change facility. Males are the typical at-home vehicle oil-changer, grouped by following age brackets (listed from the largest group to smallest): 35-44, 45-54, 18-24, over 65, 55-64, and 25-34. Race could also be considered in defining the target audience; Asian respondents reported the highest percentage of pouring used oil down the stormwater drain following servicing their vehicle. White respondents reported the highest percentage of pouring used oil in a designated section of their yard following servicing their vehicle (Bartlett C-37).

2. Vehicle Maintenance and Repair Businesses
   It could be assumed that the highest density of vehicles leaking oils and greases are located in and around commercial businesses that perform maintenance and repair on vehicles and machinery. While these vehicles await repair, they are usually stored in open (non-covered)

parking lots; the runoff from large parking lots are a large contributor to oil and grease entering our surface waters. Also, these businesses generally have on-site storage for both new and used oils, and both have the potential to leak during filling, emptying, and storage unit failure.

3. Owners of Vehicles, Machinery, and Equipment
   This target audience is large, broad, and encompassing of residents and businesses. All vehicles, machinery, and equipment that utilize oil and grease for operation have the potential to leak and contribute to stormwater pollution. In particular, vehicle owners should be educated to check for leaks, keep vehicles tuned up, repair leaks, check tire pressure and recycle vehicle fluids and batteries. In addition, citizens should be encouraged to utilize the stormwater hotline (future) to report instances of illegal fluid dumping.

Key Outreach and Education Messages for Chemicals

- There is a direct link between plant and animal kills, habitat destruction, and water quality degradation as a result of the introduction of vehicle fluids into stormwater runoff.
- Vehicle owners should be educated to check for leaks, repair them, keep vehicles tuned up, check for proper tire pressure and recycle vehicle fluids and batteries.
- Citizens should employ a sense of responsibility and environmental stewardship to dispose of yard waste properly to dispose of litter properly and encourage the reporting of litter violators and the enforcement of litter offenses.

Message Distribution

- Develop and distribute educational brochures to the community.
- Distribute educational brochures to vehicle repair/maintenance facilities to disseminate proper chemical storage and disposal messages.
- Establish contact with local home owners association and property management companies to disseminate chemical education messages.
- Include blurbs in the citywide newsletter mailed quarterly to all citizens.
- Contact local media outlets to suggest feature stories and/or articles pertaining to problems caused by chemicals entering the stormwater drainage system.
- Distribute educational brochures on chemicals to all automobile owners in New Hanover County to encourage proper vehicle maintenance and chemical storage/disposal methods.

Assessment and Evaluation

- Periodically assess vehicle fluid disposal habits of Wilmington residents and businesses
  - Direct observation of habits
  - Surveys of habits
  - Count of citations issued pertaining to improper chemical disposal habits
  - Count of reported violations pertaining to chemical leaks or disposal habits to Stormwater Hotline
- Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting

Target Pollutant: Car Washing Soaps & Detergents
Soaps and detergents used to wash cars, boats, homes, etc. Dirt and grime from washing activities are also included with this target pollutant.

Target Pollutant Source
Washing cars, boats, homes, and driveways can send soap, dirt and grime into our waterways via stormwater runoff or hose water. Some cleaning agents are more toxic to aquatic and marine organisms than others, but improper washing of cars or boats utilizing cleaning agents of any toxicity level can negatively affect water quality by contaminating the water with sediment, debris, or chemicals washed off of vehicles, driveways, etc.

Problems & Issues
Chemicals and cleaning agents that wash into storm drains and then our waterways can destroy the external mucus layers of fish that protect them from bacteria and parasites. This leads to fish kills as a result of bacterial or parasitic infections.

Many detergents also contain phosphates which promote excessive algae and aquatic weed growth. Phosphates are nutrients that promote the growth of plants and cause the growth of algae and aquatic weeds.

During the process of washing cars, boats, etc, other pollutants such as sediment, heavy metals, and chemicals may be washed away too. These pollutants are then picked up by stormwater runoff and cause their own negative consequences to the aquatic ecosystems in our area.

Target Audience
1. Homeowners/Do-it-Yourself Car Washers
   The most important group to target concerning this pollutant is citizens that wash their cars in residential areas. Based on the survey of NC residents' habits, the members of this target group that should be given priority are people in the income bracket of $35,000 to $75,000, age group 35-44, and female (Bartlett C-37). These groups accounted for the most responses to letting their soapy water run into the street or driveway.

2. Do-it-Yourself Boat Washers
   Although the survey did not include any questions on the washing habits of boat owners, this group should be given a high priority because of the potential to directly contaminate surface waters when washing their boats at moor. Boat owners that wash their boats at home on the trailer should be included in the same group as the do-it-yourself car washer.

3. Businesses Related to Home, Car, and Boat Cleaning
   It is important to include businesses that perform cleaning or detailing of cars and boats in education and outreach efforts. These businesses include:
   - Mobile Cleaning Businesses, including pressure washing and boat cleaning services
   - Car Detailing Facilities (stationary)
   - Automobile Sales Businesses

4. General, Encompassing Audience
   A general target audience is necessary because all residents and/or businesses have the potential to contribute to this target pollutant through simply washing something outdoors, such as driveways, homes, lawn furniture, or just about anything else.

Key Outreach and Education Messages for Soaps and Detergents

- Create awareness of the impact of the vehicle washing activities into surface waters either directly or via stormwater runoff.
- There is a direct link between aquatic impacts such as algal blooms and fish kills as a result of improper vehicle care habits.
- Messages should encourage citizens to wash vehicles on the grass, use a phosphate-free detergent, and/or use a commercial car wash.
- Citizens should employ a sense of responsibility and environmental stewardship to practice vehicle washing so that it does not harm the environment or our waterways.

Message Distribution

- Distribute educational brochures to automobile owners in New Hanover County to disseminate messages on proper automobile washing practices.
- Distribute educational brochures to boat owners in New Hanover County to disseminate messages on proper boat washing practices.
- Establish contact with business related to automobile or boat cleaning and pressure washing to disseminate messages on cleaning agents entering the stormwater drainage system.
- Partner with commercial car wash businesses to promote their use as an alternative to washing on the street or driveway.
- Develop and distribute advertisements about vehicle washing to run in print media.
- Establish contact with local home owners associations and property management companies to disseminate educational messages on cleaning agents.
- Include blurbs in the citywide newsletter mailed quarterly to all citizens.
- Contact local media outlets to suggest feature stories and/or articles pertaining to problems caused by cleaning chemicals/agents entering the stormwater drainage system.

Assessment and Evaluation

- Periodically assess vehicle washing and exterior home washing habits of Wilmington residents by:
  - Direct observation of habits
  - Surveys of habits

APPENDIX C

PUBLIC INVOLVEMENT AND PARTICIPATION

Included in this section:

- BMP Reporting Table
- Contracts/Cooperative Agreements with:
  - New Hanover Soil & Water Conservation District
  - Cape Fear River Watch, Inc.

DATE/ TIME	PLACE	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY OR INFO COLLECTED
BMP(a) Administer a Public Involvement Program					
This requirement is being met as outlined in b-e below					
BMP(b) Allow the Public and Opportunity to Review & Comment on Stormwater Plan					
1/17/2008	City Council Chambers	General public, developers, architects, etc.	Stormwater Services City Planning staff City Engineering staff	Public input meeting Results posted on website	Instruments used to collect public input about stormwater ordinance revision: -Stormwater Survey -Questionnaire -White board suggestions
BMP(c) Organize a Volunteer Community Involvement Program					
The City of Wilmington contracts annually with Cape Fear River Watch (CFRW) and New Hanover Soil & Water Conservation District (NHSWCD) to implement public involvement and participation activities, as well as education and outreach activities. Both organizations sign a yearly contract with specified deliverables that enable the City to meet many NPDES BMP requirements. Copies of these contracts and yearly reports are included in the Appendix. Below is a summary of each organization's deliverables in regards to NPDES:					
CFRW - implement creek and watershed cleanups, monitor/maintain/provide public education for Kerr Avenue Wetland, coordinate workshops for City personnel, provide educational programs for City residents (i.e. Saturday seminars, Greenfield Lake eco-tours, presentations for civic groups, etc.), partner on grant projects (i.e. 319 grant, CWMTF grant) and implement backyard BMPs, conduct Enviroscape presentations for 8th grade students, monitor and report monthly on Greenfield Lake, participate and provide assistance for public meetings and hearings conducted by Stormwater Services, provide mid-year and year end contract reports of all deliverables.					

NHSWCD - provide Enviroscape presentations to 8th grade students, conduct presentations for civic and community groups, assist with creation of LID ordinance, assist with City's public involvement efforts, work with citizens to identify and install backyard BMPs, administer statewide CCAP program in area watersheds, increase awareness of fecal coliform pollution, organize/facilitate environmental field days and teacher workshops, facilitate Stewardship Development programs to promote outstanding environmental stewardship, participate in community outreach events, serve as lead agency for land conservation efforts in the Hewlett's Creek Watershed, conduct watershed-based community outreach.

BMP(d) Establish a Mechanism for Public Involvement					
1/17/2008	City Council Chambers	General public, developers, architects, etc.	Stormwater Services City Planning staff City Engineering staff	Public input meeting Results posted on website	Instruments used to collect public input about stormwater ordinance revision: -Stormwater Survey -Questionnaire -White board suggestions
Ongoing	Stormwater office via phone or email, public meetings, etc.	General public, citizens, businesses	Stormwater staff	Email or phone responses to citizen requests for information, literature, etc.	Information provided for specific nature of contact

BMP(e) Establish a Hotline/Helpline
This BMP will occur according to schedule in Year 3.

Cape Fear River Watch, Inc.

617 Surry Street ♦ Wilmington, NC 28401 ♦ 910-762-5606

July 3, 2007

Mr. Dave Mayes
Stormwater Services Manager
Public Services, Stormwater Services
209 Coleman Drive
PO Box 1810
Wilmington, NC 28402-1810

Dear Dave,

Enclosed is the Scope of Services for 2007 – 2008.

The opportunity to work with the City of Wilmington through a mutually- beneficial agreement that enhances the City's outreach and education efforts and supports CFRW's mission to improve the water quality of the Lower Cape Fear River is greatly appreciated. The new scope of services will enable us to continue to make significant progress by focusing our efforts on education programs, watershed clean-ups and advancing the volunteer "Creekkeeper "program.

Many of the services CFRW provides address specific requirements of the City's Permit to Discharge Storm Water under the National Pollutant Discharge Elimination System. (NPDES). These Permit requirements include the following *Objectives* and *BMPs specified* to meet NPDES *Measurable Goals*:

- *Conduct Public Outreach Activities.* CFRW assists in the development and distribution of public educational material.

- *Establish a Public Education and Outreach Program.* CFRW plans, implements and documents community events, stream and liter clean-ups, and group presentations.

- *Public Involvement and Participation.* CFRW plans, implements and documents a volunteer community involvement program that includes waterway clean-ups, watershed monitoring, Enviroscape presentations in schools, eco-tours of Greenfield Lake and college intern education and stewardship.

At this point, more than half way through our current agreement, we have learned a great deal and we have made both significant improvements and progress in the quantity and the quality of our services. 22 volunteers participated in our most recent watershed clean-up event. More than 80 people attended the January seminar program which featured a presentation by Andy

Wood. We now have 2 qualified and trained volunteers conducting Enviroscape classroom presentations. We are confident that by the end of our current agreement we will have revitalized volunteer "Creekkeeper" watershed monitoring and will be providing reports for high priority City watersheds.

We are requesting $xxxxx to continue to build on our accomplishments, and to address increased expenditures required to sustain high quality services. As a not-for –profit organization, we are not immune to the rising costs of doing business. The cost of insurance, utilities, phone service and computer access have all increased. These are all necessary for us to attract volunteers, host programs and provide working space for staff. In addition, increased energy costs have eroded the relatively low wages we are able to pay staff, and we currently do not offer any reimbursement for travel costs. There is quite a bit of local driving required to implement this agreement.

The City receives great value for the investment made in our Scope of Services Agreement. This year the City's investment of $11,000 will yield, more than 600 hours of paid CFRW staff time that is devoted to planning, conducting, supervising and documenting the services and programs we provide. Paid staff time is enhanced and complimented by over 700 hours of volunteer and college intern work. The hours of service provided are further enhanced by in-kind contributions that include travel costs and services that are non-paid. One example in-kind contribution is the kayaks that were donated for a clean-up on Burnt Mill Creek.

The small amount of additional funding we are requesting will allow us additional staff time and resources needed to continue expanding our volunteer base, meet increasing costs, and have the option of providing some travel reimbursement for staff. We are confident that this additional funding will result in continued progress in accomplishing our mutual goal of improving water quality through public education, outreach, and action.

Yours truly,

Paul G. Nelson
President

Cape Fear River Watch, Inc.

617 Surry Street ♦ Wilmington, NC 28401 ♦ 910-762-5606

2007-08 Scope of Services Contract

Cape Fear River Watch, Inc., under contract with the City of Wilmington's Stormwater Services, will provide the following services for the agreed amount of $xxxxx:

1. Continue clean-ups of local watersheds. These cleanups will focus on Greenfield Lake, Smith Creek, Burnt Mill Creek, and as the need is discovered by the City or volunteer Creek Keepers. This will include the coordination of at least one site for Big Sweep, an annual international clean-up. A minimum of 7 clean-ups will be completed. A summary of each clean-up will be completed and submitted to Stormwater Services. The summary will include the specific areas/waterways cleaned, number of participants, hours worked, estimate of quantity of waste materials removed, and if possible photographs to document the work completed.

2. Monitor and maintain the Kerr Avenue Stormwater Wetland on a monthly basis. Activities include supporting school group clean-ups, maintenance of plants as needed, evaluation and consulting on larger maintenance needs. A summary of these activities will be completed and submitted to Stormwater Services. The summary will include the number of participants, hours worked, brief description of activity, and if possible photographs to document the work completed.

3. Provide outreach and education for the Kerr Avenue Stormwater Wetland in the form of presentations to various groups, such as conference attendees, homeowner associations, students at all levels including UNCW and visiting municipal officials.

4. Coordinate Stormwater Workshops for City of Wilmington personnel twice yearly. Other City departments, such as the Streets Division, will be encouraged to attend these workshops. Topics and specific dates for these workshops will be presented for approval.

5. Provide educational programs to Wilmington residents in the form of First Saturday Seminars, presentations to community and civic organizations, and other scheduled talks in the area. Educational programs will include eco-tours at Greenfield Lake and winter, spring, and fall birding tours.

6. Continue to serve as a partner organization with Stormwater Services and NC State University for the Burnt Mill Creek Grant and initiatives implemented as part of and as a result of grant requirements.

7. Conduct Enviroscape presentations to eighth grade science classes in New Hanover County Schools. Presentations will focus on specific NC 8th grade science goals and objectives for the hydrosphere/water quality and may be done in coordination with other environmental educators. CFRW will complete a minimum of 1/3 of the presentations to 8th grade science

classes in New Hanover County Schools. CFRW will also work cooperatively with Stormwater Services to provide additional presentations in addition to the 8th grade initiative as requested. A summary will be provided for each presentation given that is not a part of the 8th grade initiative. Summary information will include the date, location and number of student participants.

8. Monitor, evaluate, and consult on aquatic vegetation management techniques implemented to improve the water quality of Greenfield Lake. Monitoring will include monthly, weekly and daily observations as applicable and as coincides with the assignment of staff and volunteers to Greenfield Lake. A brief monitoring report will be sent via email to Stormwater Services for the period from April through November.

9. Continue the Creekkeeper program and alert Stormwater Services when volunteers find problem areas.

10. Participate in and provide support and assistance for public meetings and hearings conducted by Stormwater Services.

11. Assist Stormwater Services in implementing public involvement and education activities required by NPDES permit. Also, the summary reports (i.e. clean-ups) provided by CFRW will be included in the City's NPDES yearly report to the State.

12. Provide a brief mid-year status report of contract deliverables and attend mid-year status meeting no later than December 20th. Also provide end of report no later than June 30th.

Cape Fear River Watch, Inc.

617 Surry Street ♦ Wilmington, NC 28401 ♦ 910-762-5606

Mid- Year Report
July 2007 – December 2007

1. **Continue clean-ups of local watersheds. These cleanups will focus on Greenfield Lake, Smith Creek, Burnt Mill Creek, and as the need is discovered by the City volunteer Creek Keepers. This will include the coordination of at least one site for Big Sweep, annual international clean-up. A minimum of 7 clean-ups will be completed. A summary of each clean-up will be completed and submitted to Stormwater Services. The summary will include the specific areas/waterways cleaned, number of participants, hours worked, estimate of quantity of waste materials removed, and if possible photographs to document the work completed.**

Creek/Watershed Clean-ups					
Date	**Watershed**	**Area Cleaned**	**Volunteers**	**Volunteer Hours**	**Trash**
9/29/07	Greenfield Lake (Big Sweep)	Lake and shore areas both from water and land	65 people	325 hours	70 bags */650 lbs*
10/27/07	Greenfield Lake Watershed	Greenfield Lake Feeder between Lake Branch & 11th Street	9 people	26 hours	27 bags*/810 lbs*
11/17/07	Burnt Mill Creek	Kerr Ave Constructed Wetland t.	14 people	7 hours	2 bags/*60 lbs*

2. **Monitor and maintain the Kerr Avenue Stormwater Wetland on a monthly basis. Activities include supporting school group clean-ups, maintenance of plants as needed, evaluation and consulting on larger maintenance needs. A summary of these activities will be completed and submitted to Stormwater Services. The summary will include the number of participants, hours worked, brief description of activity, and if possible photographs to document the work completed.**

On Saturday, November 17th CFRW volunteers completed a cattail removal and clean-up project at the Kerr Ave. Wetland. A full report on this project was submitted the following week complete with photo documentation. In the area worked on by CFRW, volunteers also harvested and transplanted more desirable sedges. The area worked on will be monitored to gauge the effectiveness of this removal strategy and determine the success of the harvested and transplanted sedges.

3. **Provide outreach and education for the Kerr Avenue Stormwater Wetland in the form of presentations to various groups, such as conference attendees, homeowner associations, students at all levels including UNCW and visiting municipal officials.**

A meeting is planned for January 13, 2008 for 20+ business owners and managers who operate business in the 2 shopping malls that are adjacent to the Kerr Avenue Wetland. The letter of

invitation is set to be sent before the end of December. The orientation session for these business owners and managers will include a presentation on water pollution and BMPs and will focus on what makes the Kerr Avenue Wetland unique. They will also learn what they can each do to reduce non-point source impacts of their businesses and what they can do to help maintain and enhance the Kerr Avenue Wetland and increase public understanding of this functioning constructed wetland.

4. Coordinate Stormwater Workshops for City of Wilmington personnel twice yearly. Other City departments, such as the Streets Division, will be encouraged to attend these workshops. Topics and specific dates for these workshops will be presented for approval.

On December 5, 2007 Cape Fear River Watch assisted Stormwater Services in presenting a 2-hour workshop on *Pollution Prevention and Good Housekeeping* for city maintenance supervisors from several city public works departments. A second *Pollution Prevention and Good Housekeeping* workshop is being planned for early January.

The proposal for a spring workshop for Stormwater Services employees is being developed in cooperation with NC State and will be submitted for review and approval before the end of January.

5. Provide educational programs to Wilmington residents in the form of First Saturday Seminars, presentations to community and civic organizations, and other scheduled talks in the area. Educational programs will include eco-tours at Greenfield Lake and winter, spring, and fall birding tours.

First Saturday Seminars			
Date	**Speaker, Organization**	**Topic**	**Attendance**
November 2007	Joe Abbate, CFRW	Shore Bird Ecology	8 people
December 2007	Ryan Glass , NC Aquarium at Ft. Fisher	Fish of the Cape Fear River	24 people

Outside Presentation by Cape Fear River Watch Staff			
Date	**Organization**	**Topic**	**Attendance**
August 2007	YMCA Men's Club	CFRW Programs and Water Quality	50
August 2007	Water Mark Marina	CFRW Programs and Water Quality	15
August 2007	Various hosted by CFRW	Oyster and Shell Fish Summit	18
September 2007	CG Power Squadron	CFRW Programs and Water Quality	60
October 2007	Green Building Alliance	CFRW Programs and Water Quality	15
November 2007	Sierra Club	CFRW Programs and Water Quality	22
November 2007	UNCW Students	MFA Program Water Quality	12
December	Various hosted by CFRW	Oyster and Shell Fish Summit	8

Greenfield Lake School Field Trips The following educational presentations included water quality, pollution, freshwater ecology, and plant and animal adaptations.				
School	**Date**	**Grade(s)**	**# of Students**	**Comments:**

UNCW Marine Quest	July 18 – Aug 8	4th- 7th	46 students	Weekly summer camp program
Oak Island Recreation	July 31	2nd- 5th	25 students	
CF Center for Inquiry	Sept 4	5th & 6th	23 students	
Friends School	Sept 19	4th	22 students	

Greenfield Lake Eco-tours:
41 Eco-tours were conducted from July 2007 through December 2007. These tours served 123 people who received a 2-hour tour of Greenfield Lake on CFRW's electric powered 6-person canoe. These trips highlight bird life and alligators but also address stormwater pollution impacts, strategies to reduce these impacts, and ecological issues relating to water quality.

6. Continue to serve as a partner organization with Stormwater Services and NC State University for the Burnt Mill Creek Grant and initiatives implemented as part of and as a result of grant requirements.

In addition to attending regularly scheduled meetings, CFRW participated in the following activities:

- Birch Creek Week- October 28th to November 3rd
  Bill Murray showed the film "Troubled Waters and conducted a discussion of the film on Oct. 28th. Doug Springer talked about CFRW and the status of Burnt Mill Creek watershed on Oct 29th. Joe Abatte conducted a guided bird walk and lecture on Nov 2nd.
- CFRW staff and volunteers assisted in the installation and planting of the extensive BMP completed at Mary Bridgers Park.

Bottoms Neighborhood/Rain Garden Project:
The Bottoms community watershed education and backyard rain garden projects were a part of a 319 EPA grant acquired by Watershed Education for Communities and Local Officials(WECO) division of NC State University to improve the health of Brunt Mill Creek Watershed. The scope of the EPA grant was three fold: 1) to initiate watershed education and outreach, 2) to install a range best management projects, and 3) to implement backyard rain gardens for the Bottom Neighborhood in the Burnt Mill Creek watershed. Cape Fear River Watch Inc. partnered with NC State in August of 2006 to facilitate the Burnt Mill Creek backyard rain garden portion of the EPA grant.

During this reporting period, 4 rain gardens were constructed in the Bottoms Neighborhood at the following locations:

- Ann Haskens residence, 305 South 14th St., 4' X 10' rain garden
- Angela M. Purdee residence, 513 South 15th St., 4'X 10' rain garden
- Jeff Schwartz residence, 124 South 11th St., 3' X 10' rain garden
- Rose Stellers residence, 311 South 14th St., 7' X 10' rain garden

In addition 10 rain barrels were delivered and installed at the following locations:

- Adron Amassey residence, 117 South 14th Street
- Family Resources Center, 1100 Orange St.

- Margaret Horton residence, 211 South 14th St.
- Marcus McCrimmon residence, 1105 Ann St.
- Mary Mosley residence, 205 South 13th St.
- Elsie Ozaka residence, 312 South 17th St.
- Angela M. Purdee residence, 513 South 13th St.
- Rose Stellers residence, 311 South 14th St
- Spence Swinton residence, 1710 Wrightsville Ave.

7. Conduct Enviroscape presentations to eighth grade science classes in New Hanover County Schools. Presentations will focus on specific NC 8th grade science goals and objectives for the hydrosphere/water quality and may be done in coordination with other environmental educators. CFRW will complete a minimum of 1/3 of the presentations to 8th grade science classes in New Hanover County Schools. CFRW will also work cooperatively with Stormwater Services to provide additional presentations in addition to the 8th grade initiative as requested. A summary will be provided for each presentation given that is not a part of the 8th grade initiative. Summary information will include the date, location and number of student participants.

8th Grade Enviroscape Presentations – Fall 2006				
Date	**School/Event**	**Grade**	**# of presentations**	**# of students**
10/18/07	Murray	8th	2 presentations	45 students
10/22/07	DC Virgo	8th	2 presentations	41 students
11/06/07	Williston	8th	2 presentations	42 students
11/08/06	Williston	8th	2 presentations	38 students
Other Enviroscape Presentations – Fall 2006				
10/31/07	NHC Fair	Grades 3 & 4	5 presentations	120+ students
11/2/07	NHC Fair	Grades 3 & 4	5 presentations	120+ students

**18 Presentations were completed to 406+ students*

In addition to the presentations a volunteer instructor training workshop was conducted on Wednesday, Oct. 14, 2007 from 7 PM to 9PM for 2 UNCW Interns and 2 volunteer instructors. Additional volunteer instructor workshops are planned for the spring semester.

8. Monitor, evaluate, and consult on aquatic vegetation management techniques implemented to improve the water quality of Greenfield Lake. Monitoring will include monthly, weekly and daily observations as applicable and as coincides with the assignment of staff and volunteers to Greenfield Lake. A brief monitoring report will be sent via email to Stormwater Services for the period from April through November.

Reports with photos submitted as requested.

9. Continue the Creekkeeper program and alert Stormwater Services when volunteers find problem areas.

Volunteer watershed monitor training will begin on Saturday January 19, 2008. Volunteer training will be combined with work in the field to complete a basic monitoring report to document and photograph field observations. These basic reports will be submitted to Stormwater Services in a format similar to the format we are currently following for Greenfield Lake monitoring. Volunteer training and watershed monitoring will continue on the 3rd Saturday of each month through the end of the year. As the number of volunteers grows and as their skills and abilities expand we will increase the number of watershed areas monitored on a regular basis.

10. Participate in and provide support and assistance for public meetings and hearings conducted by Stormwater Services.

None scheduled during this reporting period.

11. Assist Stormwater Services in implementing public involvement and education activities required by NPDES permit. Also, the summary reports (i.e. clean-ups) provided by CFRW will be included in the City's NPDES yearly report to the State.

CFRW representatives participated in an October 12, 2007 meeting at the NC Aquarium at Fort Fisher to learn more about the Shortnose Sturgeon and to help develop educational and outreach strategies to increase public understanding and awareness of this endangered Cape Fear River fish. CFRW agreed to participate and contribute to further research on the Shortnose Sturgeon. At this point our efforts have been informal, simply asking people who live or work on the Cape Fear River about their experience or sightings. We have not come in contact with anyone who has seen or heard of any recent Shortnose Sturgeon encounters or sightings. One gentleman whose family has lived on Sturgeon Creek for three generations has stated that he last witnessed Sturgeon in that creek in 2004.

CFRW also agreed to assist in providing educational material and programs on the Shortnose Sturgeon and the significance of this endangered species for the general public through our newsletter, web site, and First Saturday Seminars. On December 1st 2007 Ryan Glass from the NC Aquarium at Fort Fisher presented a one hour program on the anadromous fish of the Cape Fear River which highlighted the Shortnose Sturgeon and the threats to its survival.

12. Provide a brief mid-year status report of contract deliverables and attend mid-year status meeting no later than December 20th. Also provide end of report no later than June 30th.

Report Completed By: Bill Murray December 28, 2007

Cape Fear River Watch, Inc.

617 Surry Street ♦ Wilmington, NC 28401 ♦ 910-762-5606

Year End Report
July 2006 - June 2007

1. **Continue clean-ups of local watersheds. These cleanups will focus on Greenfield Lake, Smith Creek, Burnt Mill Creek, and as the need is discovered by the City or volunteer Creek Keepers. This will include the coordination of at least one site for Big Sweep, an annual international clean-up. A minimum of 7 clean-ups will be completed. A summary of each clean-up will be completed and submitted to Stormwater Services. The summary will include the specific areas/waterways cleaned, number of participants, hours worked, estimate of quantity of waste materials removed, and if possible photographs to document the work completed.**

   Eight clean-ups have been completed as detailed in the chart that follows. A total of 141 volunteers expended a total of 557 volunteer hours to remove more that 202 bags full of trash from Wilmington watersheds.

Creek/Watershed Clean-ups					
Date	**Watershed**	**Area Cleaned**	**Volunteers**	**Volunteer Hours**	**Trash**
10/7/06	Greenfield Lake (Big Sweep)	Lake and shore areas both from water and land	12 people	60 hours	15 bags
11/20/06	Greenfield Lake Cape Fear River Greenfield Lake	Burnett St. (ditch east of Stihl Equipment) Front St (ditch starting south of railroad tracks) 13th Street from Lakeside School to 1st bridge)	5 people 5 people	10 hours 2.5 hours 2.5 hours	11 bags 5 bags 6 bags
12/4/06	BMC	City property at end of Klein St.	4 people	15 hours	20 bags
12/16/06	Greenfield Lake	Western shore line	17 people	51 hours	15 bags
1/22/07	Burnt Mill Creek	Kerr Ave Wetland, Randall Pond, and Randall Pond SW Demo Site area. Wetland and adjacent area including rd shoulder, in-lake stream and pond perimeter, entire BMP Demo site .	22 people	88 hours	44 bags
02/24/07	Greenfield Lake	The land group, guided by Tom Tewey, concentrated their cleanup effortS near the water front from the boat house area to Jackson Pt. The water clean up area began just south of Lion's Bridge, and continued into all three major dog legs.	15 people on land 35 people on water 50 people total	175 hours on water 75 hours on land 250 hours total	40 bags on water 25 bags on land 65 bags total, plus several items too large

					to bag. Trash of interest: a bike, lots of bottle caps, cell phone, and several five gallon buckets.
04/21/07	Greenfield Lake	Greenfield Street from 1300 to 1600 block including 2 vacant lots	17 people	51 hours	20 bags Trash of interest:a toilet, computer, assortment of car parts, car batteries, tires and hub caps.
06/16/07	Burnt Mill Creek	Kerr Avenue Wetland, both sides of Kerr Ave. adjacent to wetland, area behind stores to College Road. Ditch along North side of N. MacMillan Ave and drainage swale on east side of old 84 Lumber building.	9 people	27 hours	18 trash bags Trash of interest: plastic wading pool, wire basket

2. **Monitor and maintain the Kerr Avenue Stormwater Wetland on a monthly basis. Activities include supporting school group clean-ups, maintenance of plants as needed, evaluation and consulting on larger maintenance needs. A summary of these activities will be completed and submitted to Stormwater Services. The summary will include the number of participants, hours worked, brief description of activity, and if possible photographs to document the work completed.**

   Periodic inspections of the Kerr Avenue Wetland have been completed.
   No active maintenance has taken place during this reporting period. Plant growth is so successful at the Kerr Avenue site that it has become difficult to access. This makes it a clean-up location that is too difficult for school groups. Overall, the entire site is in great shape. There is some clean-up that can be done by adults, college-age and older, due to the tangle of vegetation and steep banks. We think some work may need to be done on vegetation to remove invasive species and perhaps use this as a source of native plant material through selective and careful thinning.

   A clean-up was conducted on 6-16-07 (see above).

3. **Provide outreach and education for the Kerr Avenue Stormwater Wetland in the form of presentations to various groups, such as conference attendees, homeowner associations, students at all levels including UNCW and visiting municipal officials.**

   There were no Kerr Avenue Wetland programs completed during this reporting period.

4. Coordinate Stormwater Workshops for City of Wilmington personnel twice yearly. Other City departments, such as the Streets Division, will be encouraged to attend these workshops. Topics and specific dates for these workshops will be presented for approval not later than September 1, 2006.

A one-day workshop for City of Wilmington Stormwater Services employees was completed on Thursday April 12, 2007. CFRW coordinated this workshop on the use of vegetation for stream bank stabilization. This hands on and feet wet workshop was conducted in the field on a section of the Downey Branch Creek by Lara Rozzell, Biological and Agricultural Engineering Extension Associate from North Carolina State University. Lara Rozell presented and explained two techniques for using plants to stabilize stream banks and worked with Stormwater Services employees to install these on three problem areas on the banks of the Downey Creek Branch in the Birch Creek housing development. One technique applied in two areas involved making a mat using live stakes to stabilize erosion control material, transplating a grid of native grasses and shrubs, and over seeding the entire area with seed mix used for bank control. The second technique called a " mattress" was installed on an area of the bank that was actively being eroded due to water current. This involved forming a thick grid of plant materials and live staking this in place by weaving a grid with string to hold the plant materials in place to allow the plant material time to root and become established.

CFRW has been actively monitoring the areas repaired and has been sending monthly photos to Stormwater Services and Lara Rozzell.

5. Provide educational programs to Wilmington residents in the form of First Saturday Seminars, presentations to community and civic organizations, and other scheduled talks in the area. Educational programs will include eco-tours at Greenfield Lake and winter, spring, and fall birding tours.

First Saturday Seminars			
Date	**Speaker, Organization**	**Topic**	**Attendance**
July 2006	Joe Abbate, CFRW	Shore Bird Ecology	6-8 people
August 2006	Mike Mallin, UNCW	Cape Fear River Water Quality	6-8 people
September 2006	Stephen Taylor, NC Marine Fisheries	Oyster Shell Recycling	6-8 people
October 2006	Brian Capo, Urban Forester Coop Ext.	Long Leaf Pine Ecosystems	6-8 people
November 2006	Erin Zook, UNCW	Wetland Ecosystem Dynamics	6-8 people
January 07	Andy Wood, NC Audubon	Shore Bird Ecology	80 people
February 07	Jacqueline Major, Water Conservation Steward for the City of Wilmington.	City of Wilmington Water Conservation Program	15 people
March 07	Nancy Preston Conservation Outreach Coordinator, North Carolina Coastal Land Trust	Past and present conservation victories in New Hanover County, and explain how the public can get involved in preserving sensitive habitats in Wilmington for the future.	8 people
April 07	Brent Manning , Cape fear Bio-Fuel	Alternative Fuels and environmental Benefits	5 people
May 07	Tom Tewey	Global Warming	3 people
June 07	Rick Dove,	Impact of Hog Farm Lagoons and	Cancelled by speaker

	Waterkeeper Alliance	Spray Fields on SE NC Watersheds	

Attendance at these First Saturday Seminars continues to be weaker than we would like. Average attendance increased because of the Andy Wood presentation. This is not a reflection on the quality of the presentations which have all been excellent. Rather this is a challenge for us to better publicize and entice people to take advantage of these wonderful learning opportunities. The CFRW Board has made this a priority for CFRW and the Board and staff will be working together to improve publicity, add email lists, and explore options to improve this excellent but poorly attended program.

Greenfield Lake School Field Trips

The following educational presentations included water quality, pollution, freshwater ecology, and plant and animal adaptations.

School	Date	Grade(s)	# of Students	Comments:
DC Virgo	Sept 23, 24, 2006	?	58 students	
CFCI	Nov 27, 28, 2006	?	26 students	
Home School Group	?	3rd & 4th grade	5 students	Weekly program
Christian School	?	4th & 5th grade	10 students	
CFCI	May 22, 2007	6-8th grade	20 students	
CFCI	Jan 24, 2007	6-8th grade	8 students	
CFCI	Jan 25, 2007	6-8th grade	18 students	
Hardin School	April 4, 2007	6th grade	36 students	
Lakeside School	March 27, 2007	8th grade	12 students	

Greenfield Lake Eco-tours:

61 Eco-tours were conducted from July 2006 through December 2007 .These tours served between 244 and 305 people who received a 2-hour tour of Greenfield Lake on CFRW's electric powered 6-person canoe. These trips highlight bird life but also address stormwater pollution impacts, strategies to reduce these impacts, and ecological issues relating to water quality.

CFRW Summer Camp Program:

This new program conducted in July and August attracted 25 children who learned about water quality and fresh water ecology while participating in a number of fun and learning activities.

UNCW Marine Quest Summer Camp Program:

Greenfield Lake was a weekly stop for this summer camp program conducted in July and August. Marine Quest campers learned about water quality, pollution and fresh water ecology. Between 175 to 200 campers participated in the Greenfield Lake day as part of their Marine Quest experience. The program started once again in June 2007 and so far an additional 80 campers have enjoyed Greenfield Lake.

Brunswick County Recreation:

27 children ages 9-10 enjoyed a day long program at Greenfield Lake on June 15th.

Community Paddle and Presentation:
25 people participated in a community paddle on the Cape Fear River on Nov. 11, 2006, with John Pugh who paddled from Jordan Lake to Southport as a source to the sea educational program. John and Cape Fear River Watch members talked about water quality issues and the wonderful natural resources and wildlife that depend on the river. 8 people attended John's evening presentation where he talked about his experience paddling the Cape Fear, water quality, and educational efforts.

6. **Continue to serve as a partner organization with Stormwater Services and NC State University for the Burnt Mill Creek Grant and initiatives implemented as part of and as a result of grant requirements.**

In addition to attending regularly scheduled meetings Cape Fear River Watch participated in the following activities:

- Birch Creek Week- September 17 to the 23rd
  Joe Abatte conducted a guide walk to look at plant and animal life. Bill Murray participated in a panel presentation on water quality issued facing Wilmington and the Cape Fear River.
- Port City Java BMP:
  Joe Abbate, a CFRW intern, and a volunteer helped with the planting.
- Gregory School BMP:
  Joe Abbate, Bill Murray, and an intern helped install this demonstration BMP.
- Anderson Tabernacle Church BMP:
  Joe Abbate, an intern, and a volunteer helped install this BMP at the church on 17th Street and Ann Street in the Bottoms neighborhood.
- Backyard BMP:
  Joe Abbate, Bill Murray, an intern, and a volunteer helped install this demonstration rain garden at a private residence on 17th Street in the Bottoms Neighborhood.

Bottom Neighborhood/Rain Garden Project:
The Bottoms community watershed education and backyard rain garden projects were a part of a 319 EPA grant acquired by Watershed Education for Communities and Local Officials(WECO) division of NC Sate University to improve the health of Brunt Mill Creek Watershed. The scope of the EPA grant was three fold: 1) to initiate watershed education and outreach, 2) to install a range best management projects, and 3) to implement backyard rain gardens for the Bottom Neighborhood in the Burnt Mill Creek watershed. Cape Fear River Watch Inc. partnered with NC State in august of 2006 to facilitate the Brunt Mill Creek backyard rain garden portion of the EPA grant.

Cape Fear River Watch Inc. to date has implemented five backyard rain gardens in the Burnt Mill Creek, bottoms community area under the EPA 319 grant. The gardens have ranged in size from to 600 sq.ft.-2000 sq.ft. The construction of the backyard rain gardens has been embraced by community homeowners, and has lead to several homeowners

customizing additional home improvements to make the rain gardens and barrels work more efficiently.

6 rain gardens were constructed in the Bottoms area of Brunt Mill Creek. The average size of the backyard rain gardens was 4x10, with native plants installed. Several participants invested money in gutter and drains to maximize affiance of rain garden function.
Also CFRW has been labor and plant consultant on Brunt Mill Creek BMP projects. To date CFRW has partnered on Port City, Gregory Elementary, Stonesthrow wetland, Mary Bridger's wetland. The following are rain gardens installed in the Bottom Neighborhood:

- Anderson Tabernacle/ 5'x 10'
- Elsie Ozaka/ 4'x 10'
- Angela Purdie/ 4'x 10'
- Hollis Briggs/ 4'x 10'
- Eddie Seller/ 7'x 12'
- Mary Mosley/ 6'x 10'

7. **Conduct Enviroscape presentations to eighth grade science classes in New Hanover County Schools. Presentations will focus on specific NC 8th grade science goals and objectives for the hydrosphere/water quality and may be done in coordination with other environmental educators. CFRW will complete a minimum of 1/3 of the presentations to 8th grade science classes in New Hanover County Schools. CFRW will also work cooperatively with Stormwater Services to provide additional presentations in addition to the 8th grade initiative as requested. A summary will be provided for each presentation given that is not a part of the 8th grade initiative. Summary information will include the date, location and number of student participants.**

8th Grade Enviroscape Presentations – Fall 2006				
Date	**School/Event**	**Grade**	**# of presentations**	**# of students**
10/2/06	Murray	8th	2 presentations	48 students
10/17/06	Murray	8th	1 presentations	23 students
10/25/06	DC Virgo	8th	2 presentations	58 students
11/14/06	Williston	8th	1 presentations	20 students
12/5/06	Williston	8th	2 presentations	40 students
Other Enviroscape Presentations – Fall 2006				
9/2/06	Eaton Elementary	Grade 3 & 4	2 presentations	58 students
12/4/06	CFCI School	Grade 7	1 presentations	12 students
12/6/06	CFCI School	Grade8	1 presentations	14 students
11/2/06	NHC Fair	Grades 3 & 4	4 presentations	90+ students
11/3/06	NHC Fair	Grades 3 & 4	5 presentations	120+ students
8th Grade Enviroscape Presentations - Spring 2007				
Date	**School/Event**	**Grade**	**# of presentations**	**# of students**
02/21/07	Roland Grise	8th	2 presentations	48 students
02/27/07	Noble	8th	3 presentations	71 students
03/01/07	Noble	8th	1 presentations	25 students
03/27/07	Noble	8th	1 presentations	22 students
04/25/07	Myrtle Grove	8th	2 presentations	43 students

05/09/07	Trask	8th	1 presentations	23 students
05/15/07	Trask	8th	2 presentations	48 students
Other Enviroscape Presentations - Spring 2007				
Date	**School/Event**	**Grade**	**# of presentations**	**# of students**
01/29/07	Cape Fear Center for Inquiry	7th & 8th	1 presentations	20 students
02/01/07	Cape Fear Center for Inquiry	7th & 8th	1 presentations	16 students

**36 Presentations were completed to 844+ students*

8. **Monitor, evaluate, and consult on aquatic vegetation management techniques implemented to improve the water quality of Greenfield Lake. Monitoring will include monthly, weekly and daily observations as applicable and as coincides with the assignment of staff and volunteers to Greenfield Lake. A brief monitoring report will be sent via email to Stormwater Services for the period from April through November.**

   Reports with photos submitted as requested.

9. **Investigate and expand oyster recycling program currently being offered. This project will ultimately assist with a project to improve the oyster reefs in our area.**

   No time spent in this area per meeting and agreement with Dave Mayes.

10. **Continue the Creekkeeper program and alert Stormwater Services when volunteers find problem areas.**

    Creek monitoring by volunteers continues to be a challenge to establish. The number of volunteers we have been able to attract to watershed clean-ups and the fact that these have once again been established as monthly activities are encouraging signs that with time and effort CFRW will be able to establish a credible and viable program. A new Riverkeeper has now been identified and hired. A great deal of time and effort was devoted to funding and recruiting for this leadership position. Doug Springer has been hired as the Riverkeeper. The additional staff time and leadership he will provide will allow us to plan and implement a successful Creek monitoring program.

11. **Participate in and provide support and assistance for public meetings and hearings conducted by Stormwater Services.**

    None scheduled during this reporting period.

12. **Assist Stormwater Services in implementing public involvement and education activities required by NPDES permit. Also, the summary reports (i.e. clean-ups) provided by CFRW will be included in the City's NPDES yearly report to the State.**

13. Provide a brief mid-year status report and end of year report and face-to-face meetings of contract deliverables to Stormwater Services no later than December 30th.

The mid-year report was completed and submitted on time.

Report Completed By: Bill Murray** ***June 25, 2007

New Hanover Soil & Water Conservation District

230 Market Place Drive ♦ Suite 100 ♦ Wilmington, NC 28403 ♦ 910-798-6032

February 5, 2007

Dave Mayes, Manager
City of Wilmington Stormwater Services
PO Box 1810
Wilmington, NC 28402-1810

Dear Mr. Mayes,

The New Hanover Soil and Water Conservation District has served as a valuable and productive partner to the City of Wilmington Stormwater Services Department for the past three years. Accomplishments include: protecting 33 acres in Hewletts Creek, receiving funds to continue land conservation throughout Hewletts Creek, providing over $10,000 in residential BMP funds, educating over 1,000 NHC students, and more!

The District hopes to continue to provide these services and more in the future, but this can only be accomplished through an increase in support. As our programs grow and expand, so do our operating expenses and staff needs. The new NC Community Conservation Assistance Program and the successful Lower Cape Fear Stewardship Development Award exemplify our need for District restructuring. Our FY08 budget request includes two new positions and increased salary and benefits for our current staff. The New Hanover Soil and Water Conservation District is therefore requesting $xxxxxx for FY07/08 to support the City of Wilmington Stormwater Services Department and its NPDES Stormwater Permit requirements. Please consider providing this 17% of our total budget to receive the following services.

A. Hewletts Creek Watershed

1. Serve as the lead agency for land conservation efforts throughout the Hewletts Creek Watershed. To date, the District has protected 33 acres along the "Conservation Greenway" through grant funded acquisitions or donations. FY08 goals are to:
   - Monitor and manage conservation easements.
   - Explore conservation options on the "landscape buffer" at The Woods at Holly Tree, the Paynter property and other critical properties in the Hewletts Creek watershed.
   - Initiate outreach and potential conservation efforts for properties in the proposed Hewletts Creek south branch greenway.
   - Identify management goals for the YWCA easement area.

2. Continue a watershed-based community outreach effort to include: community meetings and workshops, environmental education, watershed newsletter and more.

Supports the NPDES Stormwater Permit ~

B. Education and Outreach

All of the following services support the NPDES Stormwater Permit ~

1. Serve as a member of the Water Quality Education Team, providing Enviroscape presentations for at least 1/3 of 8th grade science classes in New Hanover County Schools each year. Efforts also include training instructors and assisting with outreach.

2. Increase public education on the issue of fecal coliform pollution through:
   - Assisting with development and outreach of a new City Pet Waste Ordinance
   - Maintaining the educational displays and flyers at local vet offices & pet stores
   - Compiling an address database of pet professionals
   - Initiating personal contact and communication with local veterinarians
   - Expanding the audience, through distributing materials to pet professionals, property managers, home owners associations, animal shelters, etc.

3. Organize and facilitate at least one Environmental Field Day a year, serving over 90 NHC students. Topics include: Aquatics, Forestry, Wildlife, Soils, and Environmental Issues.

4. Provide at least 5 additional school presentations (*in addition to Enviroscapes*) on the topics of Aquatics, Forestry, Wildlife, Soils, and Current Environmental Issues. These presentations always incorporate stormwater and water quality connections.

5. Provide an opportunity for 3-8th graders to learn about watersheds, water quality and stormwater through the Statewide District Poster, Essay and Speech contests. This year's theme is "We All Live in a Watershed".

6. Research grant opportunities & contact interested teachers for the creation of an Outdoor Education Learning Center on a NHC school campus in FY08. This site can be used to increase hands-on education on stormwater, water quality, wildlife habitat and more.

7. Organize, promote and facilitate at least one Teacher Workshop a year, to include: an annual week long summer workshop and the potential of a second workshop to offer one of the following curricula: Project WET; Food, Land & People; Project Learning Tree; and Wonders of Wetlands.

8. Facilitate the Stewardship Development Award Program, which recognizes developers for demonstrating outstanding environmental stewardship through the protection and awareness of our natural resources. FY08 tasks include:
   - Managing the Stewardship Development Advisory Committee
   - Expanding the program website (www.stewardshipdev.com) and pursuing funding
   - Publicizing the program through educational workshops and media outreach

- Organizing the application process, judge selection, project presentations, and annual awards banquet

9. Participate in several annual Community Outreach events:
- Assist with the planning, fundraising and publicity for the annual Lower Cape Fear Earth Day Festival
- Assist with the Treefest program, which annually distributes over 10,000 trees to New Hanover County citizens
- Participate in and help facilitate the annual Big Sweep community-wide waterway cleanup

C. Stormwater Management ~ *support the NPDES Phase II Federal Stormwater Permit ~*

1. Provide Stormwater Management Education through the following actions:
- Complete a comprehensive list of homeowners associations (HOAs) in the county.
- Conduct at least 3 presentations on stormwater, water quality, non-structural and structural best management practices (BMPs). Target audiences may include: HOAs, garden clubs, community groups, developers, and watershed-wide meetings.
- Assist the City and the County with its Water Conservation Initiative.
- Assist with the creation of a Low Impact Development (LID) Ordinance.
- Present information on LID to developers, architects, engineers, etc.
- Assist with the City's NPDES Phase II Public Involvement requirements.

2. Provide assistance with the demonstration, purchase & installation of BMPs:
- Manage the 4 Hewletts Creek residential demonstration sites.
- Provide outreach for the City of Wilmington Stormwater Demonstration Sites.
- Design and install a rain garden on the YWCA property.
- Hold an Annual Rain Barrel Sale in partnership with Rainwater Solutions.
- Participate in the Smith Creek Watershed Planning Group, to identify potential BMP locations and more.

3. Administer the NC Community Conservation Assistance Program for New Hanover County. *The District will receive $25,000 to $50,000 to be used for BMP installation in the Hewletts Creek Watershed. A second grant request has been submitted for Howe and Pages Creek. An annual allocation from the State may become available as of July 2007. FY08 tasks include:*
- Serving on the technical review committee to develop standards for eligible BMPs.
- Prioritizing applications in the Hewletts Creek watershed.
- Providing outreach, technical support and updates to current program applicants in the Hewletts Creek watershed.
- If funding is available this year, conduct site visits and develop conservation plans for the installation of stormwater BMPs.
- Initiate outreach in the Howe & Pages Creek watersheds, if the grant is approved.

The New Hanover Soil & Water Conservation District looks forward to continuing our productive partnership during the upcoming year. Thank you for considering our request. Please call if you have any questions or concerns.

Sincerely,
Shelly L. Miller, Director / Community Conservationist

New Hanover Soil & Water Conservation District

230 Market Place Drive ♦ Suite 100 ♦ Wilmington, NC 28403 ♦ 910-798-6032

Mid Year Report
July 2007 ~ January 2008

A. Hewletts Creek Watershed

1. **Serve as the lead agency for land conservation efforts throughout the Hewletts Creek Watershed. To date, the District has protected 33 acres along the "Conservation Greenway" through grant funded acquisitions or donations. FY08 goals are to:**

- **Monitor and manage conservation easements.**

Annual monitoring has been conducted on the conservation easements located in the Hewletts Creek Conservation Greenway (Holly Glen, YWCA and Fogleman). The FY08 visits are scheduled for January – February 2008.

- **Explore conservation options on the "landscape buffer" at The Woods at Holly Tree, the Paynter property and other critical properties in the Hewletts Creek watershed.**

Landowner contact needs to be initiated. Lack of legal assistance has delayed this effort.

- **Initiate outreach and potential conservation efforts for properties in the proposed Hewletts Creek south branch greenway.**

The NHSWCD Board visited potential conservation sites within the Hewletts Creek South Branch in June 2007. We have acquired real estate assistance and offers have been made to these landowners. The District is awaiting the landowner's response.

- **Identify management goals for the YWCA easement area.**

The District has been a supporting partner with the City of Wilmington and Wilmington Metropolitan Planning Organization in their grant proposal to the NCDOT Safe Routes to School program to develop a walking trail to reach Holly Tree Elementary. This proposed trail will traverse two of our conservation easements (YWCA & Holly Glen). The District plans to continue to work with this initiative to ensure environmental protection of this area and increase educational opportunities and potential installation of various best management practices.

2. **Continue a watershed-based community outreach effort to include: community meetings and workshops, environmental education, watershed newsletter and more.**
   Supports the NPDES Stormwater Permit ~
   The NHSWCD has communicated with several Hewletts Creek landowners regarding the 1st CCAP allocation. Continued outreach is planned for winter-spring 2008.

B. Education and Outreach

All of the following services support the NPDES Stormwater Permit ~

1. **Serve as a member of the Water Quality Education Team, providing Enviroscape presentations for at least 1/3 of 8th grade science classes in New Hanover County Schools each year. Efforts also include training instructors and assisting with outreach.**
   The following presentations have been completed:

8th Grade Enviroscape Presentations – Fall 2007				
Date	**School/Event**	**Grade**	**# of presentations**	**# of students**
10/15/17	Murray	8th	1 presentations	27 students
10/87/07	Murray	8th	2 presentation	51 students
11/22/07	Virgo	8th	1 presentations	10 students
10/24/07	Murray	8th	1 presentation	24 students
11/06/07	Williston	8th	1 presentation	25 students
11/08/07	Williston	8th	2 presentations	49 students
Other Environmental Education Presentations – Fall 2007				
11/02/07	Cape Fear Fair	Grade 3	4 presentations	102 students
12/12/07	Anderson Elementary Field Day	Grade 3	4 presentations	118 students

   * 6 Enviroscape presentations were given to 186 eighth grade students in NHC Schools.
   ** 2 Environmental Education presentations were given to 220 additional NHC students.

2. **Increase public education on the issue of fecal coliform pollution through:**
   - **Assisting with development and outreach of a new City Pet Waste Ordinance**

   Planned for Spring 2008
   - **Maintaining the educational displays and flyers at local vet offices & pet stores**

   Planned for Spring 2008
   - **Compiling an address database of pet professionals**

Completed

- **Initiating personal contact and communication with local veterinarians**

Planned for Spring 2008

- **Expanding the audience, through distributing materials to pet professionals, property managers, home owners associations, animal shelters, etc.**

Planned for Spring 2008

3. **Organize and facilitate at least one Environmental Field Day a year, serving over 90 NHC students. Topics include: Aquatics, Forestry, Wildlife, Soils, and Environmental Issues.**
   A Field Day was held on December 12, 2007 at Anderson Elementary, reaching over 100 3rd grade students. A second Field Day will be held in the Spring 2008.

4. **Provide at least 5 additional school presentations (*in addition to Enviroscapes*) on the topics of Aquatics, Forestry, Wildlife, Soils, and Current Environmental Issues. These presentations always incorporate stormwater and water quality connections.**
   No presentations will be given at this time, but some have already been scheduled for the spring.

5. **Provide an opportunity for 3-8th graders to learn about watersheds, water quality and stormwater through the Statewide District Poster, Essay and Speech contests. This year's theme is "We All Live in a Watershed".**
   Students at several elementary and middle school have been distributed information about this years contest. Entries for these contest are due February 1st, 2008

6. **Research grant opportunities & contact interested teachers for the creation of an Outdoor Education Learning Center on a NHC school campus in FY08. This site can be used to increase hands-on education on stormwater, water quality, wildlife habitat and more.**
   Efforts planned for Spring 2008.

7. **Organize, promote and facilitate at least one Teacher Workshop a year, to include: an annual week long summer workshop and the potential of a second workshop to offer one of the following curricula: Project WET; Food, Land & People; Project Learning Tree; and Wonders of Wetlands.**

A Wonders of Wetlands (WOW) teacher workshop was held August 9 & 10, 2007 at Airlie Gardens, 15 New Hanover County teachers. Our annual Tri-County Teacher Workshop is planned for June 2008.

8. **Facilitate the Stewardship Development Award Program, which recognizes developers for demonstrating outstanding environmental stewardship through the protection and awareness of our natural resources. FY08 tasks include:**

- **Managing the Stewardship Development Advisory Committee**

The NHSWCD office serves as the Chair of this Committee, arranging monthly full council meetings, an Annual Retreat, Committee meetings, preparing and distributing meeting minutes, serving as the program contact, managing the yearly timeline, etc.

- **Expanding the program website (www.stewardshipdev.com) and pursuing funding**

Over $8,000 in sponsorship funds were raised during the 2007 program year. The website is completed and fully functional. Periodic additions and improvements are planned.

- **Publicizing the program through educational workshops and media outreach**

There was some media coverage of the 2007 Stewardship Development Awards Banquet, including the local newspaper and several smaller publications. Program information has been provided to various groups, such as the New Hanover County Low Impact Development steering committee. The NHSWCD presented program information at the Awards Banquet, to ~ 140 attendees.

- **Organizing the application process, judge selection, project presentations, and annual awards banquet**

The 2007 program year has recently completed. Tasks included judging and primary oversight of the Awards Banquet and Outreach Committee. The Banquet was a success with ~ 140 in attendance, over $8,000 in sponsors, and awarding of 4 development projects in New Hanover County.

9. **Participate in several annual Community Outreach events:**

- **Assist with the planning, fundraising and publicity for the annual Lower Cape Fear Earth Day Festival**

The NHSWCD has participated in monthly planning meetings and organized the Fall Volleyball Tournament fundraiser. Additional efforts will increase in 2008, including primary management of Sponsors and Publicity.

- **Assist with the Treefest program, which annually distributes over 10,000 trees to New Hanover County citizens**

The NHSWCD has participated in monthly planning meetings and is a primary partner/sponsor of this event. Future efforts include volunteering during January 25 & 26 and assisting with the NHC school slogan contest.

- **Participate in and help facilitate the Big Sweep community-wide waterway cleanup**

The NHSWCD is an active member of the New Hanover Keep America Beautiful board, and helped plan the event.

C. Stormwater Management ~ *support the NPDES Phase II Federal Stormwater Permit ~*

1. **Provide Stormwater Management Education through the following actions:**
   - **Complete a comprehensive list of homeowners associations (HOAs) in the county.**

   Completed ~ updates are ongoing.

   - **Conduct at least 3 presentations on stormwater, water quality, non-structural and structural best management practices (BMPs). Target audiences may include: HOAs, garden clubs, community groups, developers, and watershed-wide meetings.**

Community Presentations			
Date	**Organization/HOA**	**Attendance**	**Topic(s)**
March 2008	Bottoms Neighborhood	*Scheduled*	Protecting Wilmington's Waterways
May 2008	Smith Creek Watershed	*Scheduled*	Protecting Wilmington's Waterways
Other Presentations			
11/27/07	Chamber of Commerce	15	District Program Overview
12/11/07	Wilmington Downtown	15	District Program Overview

A community group presentation (the Bottoms neighborhood in Burnt Mill Creek) is scheduled for March 2008. A Smith Creek Watershed-wide meeting is scheduled for May 2008. Two presentations have been given on the NHSWCD programs, including stormwater management efforts, to the Wilmington Chamber of Commerce Infrastructure Committee and the Wilmington Downtown group.

- **Assist the City and the County with its Water Conservation Initiative.**

The NHSWCD has attended planning meeting and has provided resources and assistance as needed.

- **Assist with the creation of a Low Impact Development (LID) Ordinance.**

The NHSWCD has attended all Steering Committee meetings, provided comments and assistance with its development, including presenting information at various outreach meetings.

- **Present information on LID to developers, architects, engineers, etc.**

Information has been delivered through the Stewardship Development Awards Program.

- **Assist with the City's NPDES Phase II Public Involvement requirements.**

The NHSWCD will assist as needed. A public meeting is planned for January 2008.

2. **Provide assistance with the demonstration, purchase & installation of BMPs:**
   - **Manage the 4 Hewletts Creek residential demonstration sites.**

   Ongoing
   - **Provide outreach for the City of Wilmington Stormwater Demonstration Sites.**

   Ongoing
   - **Design and install a rain garden on the YWCA property.**

   This practice has been delayed as plans are moving forward with the nature trail and Safe Routes to School program. A rain garden and other BMPs may be incorporated at a later date.
   - **Hold an Annual Rain Barrel Sale in partnership with Rainwater Solutions.**

   This sale is scheduled for March 15, 2008. Publicity is ongoing. Pre-orders have already started and have reached 100+ to date.
   - **Participate in the Smith Creek Watershed Planning Group, to identify potential BMP locations and more.**

   The NHSWCD continues to participate in this initiative. Several field visits have occurred along Smith Creek and preliminary steps have been made to identify potential BMP locations. A draft watershed plan has been developed and early planning is underway for a Smith Creek Watershed Meeting.

3. **Administer the NC Community Conservation Assistance Program for New Hanover County.** ***The District will receive $25,000 to $50,000 to be used for BMP installation in the Hewletts Creek Watershed. A second grant request has been submitted for Howe and Pages Creek. An annual allocation from the State may become available as of July 2007.***

FY08 tasks include:

- **Serving on the technical review committee to develop standards for eligible BMPs.**

Ongoing. To date, 14 BMPs have been approved by the NC Soil & Water Conservation Commission.

- **Prioritizing applications in the Hewletts Creek watershed.**

NHSWCD completed this task. The first project has been identified as the Crooked Creek HOA. **Providing outreach, technical support and updates to current program applicants in the Hewletts Creek watershed.**

Ongoing

- **If funding is available this year, conduct site visits and develop conservation plans for the installation of stormwater BMPs.**

A site visit with the engineering staff of the NC DENR Division of Soil & Water Conservation has been scheduled for December 21, 2008.

- **Initiate outreach in the Howe & Pages Creek watersheds, if the grant is approved.**

The second state-wide NC Clean Water Management Trust Fund grant has been approved for ~ $600,000. The NHSWCD is expected to receive ~ $40,000 to install BMPs in Pages & Howe Creek. Outreach will begin in 2008.

New Hanover Soil & Water Conservation District

230 Market Place Drive ♦ Suite 100 ♦ Wilmington, NC 28403 ♦ 910-798-6032

Year End Report
July 2006 - June 2007

A. Hewletts Creek

The District will continue to assist with the implementation of the *Hewletts Creek Restoration Plan for Recreational and Shellfish Waters* through the following actions:

1. **Serve as the lead agency for the multi-agency protection effort of the 55 acre "Hewletts Creek Conservation Greenway". To date, the District has protected 27.9 acres. FY07 goals include protecting the remaining non-residential and residential through grant-funded purchases and backyard easements.**
   This project, also entitled the Holly Tree Road Buffer Preservation is listed as a future water quality improvement project in the Hewletts Creek Restoration Plan (p.31)
   The NHSWCD received a $25,000 minigrant from the NC Clean Water Management Trust Fund in September 2006 to continue land conservation efforts throughout Hewletts Creek. Negotiations are underway for an easement – adjacent to the YWCA property (Henleigh Hills). Annual monitoring has been conducted on current easements in the greenway. The NHSWCD has also assisted the YWCA with the initial planning of their nature trail/outdoor classroom.

2. **Manage the Hewletts Creek Minigrant, awarded by the NC Clean Water Management Trust Fund. Up to $25,000 is available to fund pre-acquisition efforts throughout the entire watershed. In addition to the 55 acre greenway above, FY07 projects include a "South Branch Conservation Greenway" and other land protection efforts.**
   This grant was received in September 2006. Mapping of the South Branch Greenway has been completed. Landowner contact has been made. The NHSWCD Board visited these sites in June 2007. A decision to move forward will be made in July 2007. If approved, minigrant funds will be requested to accomplish the pre-acquisition tasks on several properties (appraisals, environmental site assessments, & surveys).

3. **Continue a watershed-based community outreach effort to address: water quality, stormwater, native plants, and backyard conservation opportunities. This expansive effort will include: community meetings and workshops, newsletters and more.**
   I have provided resources and landowner contacts to several groups in the Hewletts Creek watershed. The watershed newsletter should go out this summer. I am awaiting newsletter creation to include announcement of the CCAP grant funds (to be awarded July '07). I also plan to include photos of completed WHIP projects.

4. **Manage the Hewletts Creek Backyard Conservation Cost Share Program. This program is funded through the Wildlife Habitat Incentives Program (WHIP) and**

provides 75% cost-share assistance and technical support for the installation of various backyard conservation practices. During FY07, the District will complete the 3 remaining projects, including one that serve a Home Owner's Association. Funding is being pursued for continuing and expanding this program (*see C7*). The Wildlife Habitat Incentive Program (WHIP) urban conservation pilot project is completed. Over $17,000 was allocated on 4 contracts. The District plans to publicize this success in the aforementioned watershed newsletter in late summer 2007. This program, funded through the WHIP, served as a pilot project for the development of the North Carolina Community Conservation Assistance Program (NC CCAP). This program is specifically for use in urban areas and will be developed to take the place of WHIP funding in our area.

B. Education and Outreach

1. **Serve as a member of the Water Quality Education Team, providing Enviroscape presentations for at least 1/3 of 8th grade science classes in New Hanover County Schools each year. Efforts also include training interns and assisting with outreach.** This deliverable has been completed.

8th Grade Enviroscape Presentations – Fall 2006				
Date	**School/Event**	**Grade**	**# of presentations**	**# of students**
10/4/06	Murray	8th	2 presentations	52 students
10/17/06	Murray	8th	1 presentation	26 students
11/14/06	Williston	8th	3 presentations	65 students
11/15/06	Williston	8th	1 presentation	22 students
12/05/06	Williston	8th	1 presentation	23 students
Other Environmental Education Presentations – Fall 2006				
7/31/06	YWCA Camp	Grade D-3	3 presentations	61 students
8/1/06	YWCA Camp	Grade 4-5	2 presentations	43 students
9/26/06	Eaton Elementary	Grade 3-5	2 presentations	48 students
10/30/06	Tri-County Envirothon	Grades 5-12	4 presentations	30 students
8th Grade Enviroscape Presentations - Spring 2007				
Date	**School/Event**	**Grade**	**# of presentations**	**# of students**
02/14/07	Roland Grise	8th	2 presentations	46 students
03/01/07	Noble	8th	2 presentations	45 students
03/27/07	Noble	8th	2 presentations	43 students
03/27/07	Noble	8th	1 presentations	22 students
04/18/07	Myrtle Grove	8th	2 presentations	49 students
04/26/07	Myrtle Grove	8th	1 presentations	24 students
05/09/07	Trask	8th	1 presentation	12 students
05/15/07	Trask	8th	2 presentations	45 students
05/22/07	Trask	8th	2 presentations	47 students
Other Environmental Education Presentations - Spring 2007				
Date	**School/Event**	**Grade**	**# of presentations**	**# of students**
03/08/07	Codington Elem	4th	2 presentations	38 students
03/15/07	Codington Elem	4th	1 presentations	19 students
03/20/07	Coastal Envirothon	9-12th	2 Teams	12 students
04/23/07	Winter Park Elem	3rd	3 presentations	52 students
04/30/07	Winter Park Elem	5th	2 presentations	45 students

05/17/07	St. Marks Catholic	4th	1 presentation	19 students
05/18/07	St. Marks Catholic	4th	1 presentation	20 students
06/4/07	Codington Elem Environmental Field Day	4th	4 presentations	102 students

* 23 Enviroscape presentations were given to 525 eighth grade students in NHC Schools.
** 27 Environmental Education presentations were given to 500 additional students in NHC.

2. Increase public education on the issue of fecal coliform pollution through:

- **Assisting with the development of a new City Pet Waste Ordinance**
- **Assisting with the outreach campaign for this new ordinance**
- **Maintaining the educational displays and flyers at local vet offices & pet stores**
- **Expanding the audience, through distributing materials to apartment complexes, home owners associations, animal shelters, etc.**
- **Providing information to HOAs about pet waste management and the availability of pet waste stations/receptacles and signage**

Pet waste education is listed as a management strategy in the Hewletts Creek Restoration Plan (p.56) and an outreach recommendation of the Greenfield Lake Initiative Report.

During FY07, the District delivered 2 new brochure stands; and contacted 2 additional vet offices (they declined). Staff will be speaking at Paw Jam on June 9th & will have information available for the public as well. Information on pet waste and pet waste receptacles was also mailed out to two HOAs, upon request.

In addition, information on stormwater, pet waste and BMPs is incorporated into all other school presentations ~ other than Enviroscape presentations (10 total during FY07), as well as adult workshops. Lastly, a presentation was given for the Town of Kure Beach on pet waste and stormwater education & outreach along with Jennifer Butler (COW).

3. Organize and facilitate at least two Environmental Field Days a year, serving over 200 NHC students. At least one Field Day will be held at Greenfield Lake. Topics include: Aquatics, Forestry, Wildlife, Soils, a Greenfield Lake Eco Tour or Env. Issues.

A Field Day / Tri- County Envirothon was held at Airlie Gardens this past Fall and a second Field Day was held in early June 2007 at Codington Elementary. *(See numbers in chart for #1)*

4. Create an Outdoor Education Learning Center (OELC) on at least one NHC school campus in FY07, to increase hands-on environmental education about stormwater and more.

Enhancements were completed on our current OELC at Codington Elementary, along with close to $1000 worth of lesson plans and outdoor activity materials (funded

through a PLT grant). Grants are being pursued to fund another OELC at a separate location.

5. **Facilitate the Stewardship Development Award Program to recognize developers for outstanding environmental stewardship and natural resource protection.**
   FY07 tasks:
   - **Managing the Stewardship Development Advisory Committee**
   - **Expanding the website to include resources (www.stewardshipdev.com)**
   - **Pursuing additional funding and increasing publicity for this program**
   - **Organizing the application process, judge selection, and annual awards banquet**

The NHSWCD has continued to manage this growing program. Activities have included: organizing meetings, corresponding with the committee, receiving applications, etc. There were 9 applications this year and 2 full days of site tours and judging. The 2nd annual awards banquet was a huge success with 6 award winners and close to 200 in attendance. Year 3 is underway at full speed and the District is once again very involved and has given formal presentations on the program and LID practices at 4 various conferences and workshops during FY07, reaching hundreds of development professionals.

C. Stormwater Management ~ *assist City Stormwater Services with NPDES goals*

1. **Hold an annual Rain Barrel Sale in partnership with Rain Water Solutions.**
   The Rain Barrel Sale was held March 24 at Halyburton Park. It was the most successful year to date, with 88 barrels sold!

2. **Complete the contact list and location map for Homeowners Associations in New Hanover County. HOA education opportunities include: pet waste, stormwater BMPs, retention pond maintenance, and environmentally-friendly landscaping.**
   The North Carolina contact does not seem feasible. The District is working with Malissa Talbert, City PIO and Jacqueline Major, Water Use it Wisely to compile a comprehensive list of HOAs in New Hanover County. The District has combined the lists provided by the Council for Neighborhood Associations (CONA), the list compiled by the City of Wilmington Stormwater Services and the list researched by previous District interns. This list will be sent to the two individuals listed above and a final New Hanover County combined list should be complete in the next few weeks.

3. **Present the *"Protecting Wilmington's Waterways"* presentation on stormwater, water quality and non-structural BMPs to at least 3 community groups/HOAs.**

Community Presentations			
Date	**Organization/HOA**	**Attendance**	**Topic(s)**
9/20/06	Birch Creek HOA	25	Protecting Wilmington's Waterways
4/23/07	New Hanover County citizens (during NHC Govt. Week)	5	Protecting Wilmington's Waterways
6/3/07	Masonboro Home & Garden	5	Protecting Wilmington's Waterways

Other Presentations			
8/22/06	CCAP Advisory Committee	35	NC CCAP Overview
8/29/06	Southeast National Association of Conservation Districts	50	NC CCAP Overview
9/7/06	NC Resource Conservation & Development State Meeting	75	Stewardship Development Program
1/8/07	NC Association of Soil & Water Conservation Districts	85	Stewardship Development Program
1/22/07	NHC Commission Meeting	30	District Program Overview
2/21/07	Wilmington Tree Commission	18	Eagles Island Conservation
2/22/07	NHC Cooperative Extension LID Workshop	55	Stewardship Development Program
4/11/07	CCAP Advisory Committee	22	Stewardship Development Program
4/18/07	NHC Library Enviro. Panel	43	District Program Overview
4/26/07	LID Workshop for Development Professionals	55	Stewardship Development Program

Several presentations have been given to homeowners in New Hanover County on various topics. "Protection Wilmington's Waterways" was presented to three groups to t total of 35 NHC citizens. In addition to these presentations, information on stormwater and best management practices has been incorporated into the NC Community Conservation Assistance Program (NC CCAP), Stewardship Development Awards Program and LID outreach above, reaching a total of approximately 468 people.

4. **Present the follow-up presentation on structural BMPs to interested community groups, HOAs and other homeowners as requested. Explore the need for continuing the *"Planting for the Future"* series.** See above ~

5. **Explore the creation of an "*Environmentally Friendly*" Landscaper Program.** Discussions have taken place with the City of Wilmington Stormwater Services, NHC Cooperative Extension and Airlie Gardens. A workshop on Wetlands and Retention Ponds was held. A certification program is still a possibility, but the lead agency needs to be determined. A meeting with Ken Wells will be scheduled for late summer 2007.

6. **Develop a local native plant availability list and a *"Native Plants for BMPs"* ID Guide.**
   Charlotte Glen is working on something similar in Pender County for all of Coastal NC. Once this is completed, the NHSWCD may adopt & supplement it.

7. **Play a primary role in developing the NC Community Conservation Assistance Program (CCAP), which will provide education, technical and financial assistance for homeowners, businesses, and other landowners to install and maintain best management practices to reduce NPS runoff on non-agricultural lands. FY07 goals:**
   - **Seek permanent funding from the NC Legislature**

- **Serve as a member of the technical review committee, to develop BMP standards**
- **Provide extensive community outreach and education on the program**
- **A statewide NC Clean Water Management Trust Fund $500,000 grant is pending ~**

The NHSWCD has been extremely involved with this program, serving as a major resource to the NC DENR Division of Soil & Water Conservation. Presentations on the urban WHIP project in NHC and structural BMPs were given to several groups (see table above). Enabling legislation was passed by the House & Senate in August 2006. The NHSWCD is a member of the CCAP Advisory Committee and the CCAP Technical Review Committee (TRC).

Standards have been developed for 14 BMPs that have been approved by the NC Soil & Water Conservation Commission. Legislation is proposed to fund a program coordinator and BMP funds. The NHSWCD will receive approximately $50,000 from the CWMTF grant #1 for projects in Hewletts Creek. A second CWMTF grant was proposed (3/07) and the District has the potential to receive $14,000 for use in Howe & Pages Creek.

District staff recently completed and passed technical training provided by NCSU (May 2007), along with program implementation training (June 2007).

Other activities & accomplishments completed in FY07 include:

- Helping to facilitate the following events:
  - Tree Fest ~ distributed 11,000 tree seedlings
  - Earth Day ~ educated over 4,000 NHC citizens
  - Big Sweep ~ over 600 volunteers, 11,000 pounds of trash picked up
- Completing the NC Environmental Education Certification program
- Receiving a Brown Pelican Award from the NC Coastal Federation for administering the Lower Cape Fear Stewardship Development Award Program
- Serving on the following committees:
  - Smith Creek Watershed Planning Group
  - NHC LID Ordinance Steering Committee
  - Water Conservation Initiative (NHC & City of Wilmington)
- Organizing the Annual Tri-County Teacher Workshop. This year's theme "Discovering Treasures of NC" and includes information on NC geography, biodiversity, geology, and the Project Learning Tree (PLT) curriculum.

APPENDIX D

ILLICIT DISCHARGE DETECTION AND ELIMINATION

None at this time.

APPENDIX E

CONSTRUCTION SITE RUNOFF CONTROL

Included in this section:

- New Hanover County Erosion & Sedimentation Control Ordinance

New Hanover County Ordinance:
The following are excerpts culled from the New Hanover County Erosion and Sedimentation Control Ordinance:

The New Hanover County erosion and sedimentation control ordinance is adopted for the purposes of:
(1) Regulating certain land disturbing activity to control accelerated erosion and sedimentation in order to prevent the pollution of water and other damage to lakes, watercourses, and other public and private property by sedimentation; and
(2) Establishing procedures through which these purposes can be fulfilled.

General requirements of the permit include among others:

(a) *Plan required.* No person shall initiate any land disturbing activity which uncovers more than one acre without having an erosion control plan approved by the county. No land disturbing activity may be initiated until the county is notified of the date that the land disturbing activity will begin.
(b) *Protection of property.* Persons conducting land disturbing activity shall take all reasonable measures to protect all public and private property from damage caused by such activity.
(c) *More restrictive rules shall apply.* Whenever conflicts exist between federal, state, or local laws, ordinances, or rules, the more restrictive provision shall apply.
(e) *Inspections.* Any and all applicable intermediate inspections may be held in any trade (building, mechanical, electric and/or plumbing) if any land disturbing activity, on a tract, including single-family residences, is found not to be in compliance with any part of this article.
(f) *Building finals.* Building finals and/or certificates of occupancy may not be issued if any land disturbing activity, including single-family residences, is found not to be in compliance with any part of this article.

Mandatory standards for land disturbing activity
No land disturbing activity subject to the control of this article shall be undertaken except in accordance with the following mandatory standards:
(1) *Buffer zone*.
a. No land disturbing activity during period of construction or improvement to land shall be permitted in proximity to a lake or natural watercourse unless a buffer zone is provided along the margin of the watercourse of sufficient width to confine visible siltation within the 25

percent of the buffer zone nearer the land disturbing activity. Waters that have been classified as trout waters by the environmental management commission shall have an undisturbed buffer zone 25 feet wide or of sufficient width to confine visible siltation within the 25 percent of the buffer zone nearest the land disturbing activity, whichever is greater. Provided, however, that the county may approve plans which include land disturbing activity along trout waters when the duration of said disturbance would be temporary and the extent of said disturbance would be minimal. This subdivision shall not apply to a land disturbing activity in connection with the construction of facilities to be located on, over, or under a lake or natural watercourse.

b. Unless otherwise provided, the width of a buffer zone is measured from the edge of the water to the nearest edge of the disturbed area, with 25 percent of the strip nearer the land disturbing activity containing natural or artificial means of confining visible siltation.

c. The 25-foot minimum width for an undisturbed buffer zone adjacent to designated trout waters shall be measured horizontally from the top of the bank.

d. Where a temporary and minimal disturbance is permitted as an exception by subsection (1)a. of this section, land disturbing activities in the buffer zone adjacent to designated trout waters shall be limited to a maximum of ten percent of the total length of the buffer zone within the tract to be distributed such that there is not more than 100 linear feet of disturbance in each 1,000 linear feet of buffer zone. Larger areas may be disturbed with the written approval of the director.

e. No land disturbing activity shall be undertaken within a buffer zone adjacent to designated trout waters that will cause adverse temperature fluctuations, as set forth in 15 NCAC 2B.0211 "Fresh Surface Water Classification and Standards", in these waters.

(2) Graded slopes and fills. The angle for graded slopes and fills shall be no greater than the angle, from zero to nineteen degrees, which can be retained by vegetative cover or other adequate erosion control devices or structures. Only when approved by the county may slopes be steeper than two foot of run to one foot of rise. In any event, slopes left exposed will, within 15 working days or 30 calendar days, whichever is shorter, of completion of any phase of grading, be planted or otherwise provided with ground cover, devices, or structures sufficient to restrain erosion.

(3) Ground cover. Whenever land disturbing activity is undertaken on a tract comprising more than one acre, if more than one acre is uncovered, the person conducting the land disturbing activity shall install such sedimentation and erosion control devices and practices as are sufficient to retain the sediment generated by the land disturbing activity within the boundaries of the tract during construction upon and development of said tract, and shall plant or otherwise provide a permanent ground cover sufficient to restrain erosion after completion of construction or development. Except as provided in section 23-238(b)(5), provisions for a ground cover sufficient to restrain erosion must be accomplished within 30 working days or 120 calendar days following completion of construction or development whichever period is shorter.

(4) Prior plan approval. No person shall initiate any land disturbing activity on a tract if more than one acre is to be uncovered unless, 30 or more days prior to initiating the activity, an erosion and sedimentation control plan for such activity must be both filed with and approved by the county. The county shall forward to the director of the division of water quality a copy of each erosion and sedimentation control plan for a land disturbing activity that involves the utilization of ditches for the purpose of dewatering or lowering the water table of the tract.

Design and performance standards.
(a) Except as provided in subsection (b)(2) of this section, erosion and sedimentation control measures, structures and devices shall be so planned, designed and constructed as to provide protection from the calculated maximum peak of runoff from the ten-year storm. Runoff rates shall be calculated using the procedures in the USDA, Soil Conservation Service's "National Engineering Field Manual for Conservation Practices," or other acceptable calculation procedures.
(b) In high quality water (HQW) zones, the following design standards shall apply:
(1) Uncovered areas in HQW zones shall be limited at any time to a maximum total area within the boundaries of the tract of 20 acres. Only the portion of the land disturbing activity within an HQW zone shall be governed by this section. Larger areas may be uncovered within the boundaries of the tract with the written approval of the director.
(2) Erosion and sedimentation control measures, structures and devices within HQW zones shall be so planned, designed and constructed to provide protection from the runoff of the 25-year storm which produces the maximum peak rate of runoff as calculated according to procedures in the United States Department of Agriculture Soil Conservation Service's "National Engineering Field Manual for Conservation Practices" or according to procedures adopted by any other agency of this state or the United States or any generally recognized organization or association.
(3) Sediment basins within HQW zones shall be designed and constructed such that the basin will have a settling efficiency of at least 70 percent for the 40-micron (0.04 mm) size soil particle transported into the basin by the runoff of that two-year storm which produces the maximum peak rate of runoff as calculated according to procedures in the United States Department of Agriculture Soil Conservation Services "National Engineering Field Manual for Conservation Practices" or according to procedures adopted by any other agency of this state or the United States or any generally recognized organization or association.
(4) Newly constructed open channels in HQW zones shall be designed and constructed with side slopes no steeper than three horizontal to one vertical if a vegetative cover is used for stabilization unless soil conditions permit a steeper slope or where the slopes are stabilized by using mechanical devices, structural devices or other acceptable ditch liners. In any event, the angle for side slopes shall be sufficient to restrain accelerated erosion.
(5) Ground cover sufficient to restrain erosion must be provided for any portion of a land disturbing activity in a HQW zone within 15 working days or 60 calendar days following completion of construction or development, whichever period is shorter.

Responsibility for maintenance.
During the development of a site, the person conducting the land disturbing activity shall install and/or maintain all temporary and permanent erosion and sedimentation control measures as required by the approved plan or any provision of this article, the act, or any order adopted pursuant to this article or the act. After site development, the land owner or person in possession or control of the land shall install and/or maintain all necessary permanent erosion and sediment control measures, except those measures installed within a road or street right-of-way or easement accepted for maintenance by a governmental agency.

The full text of this article can be found under Chapter 23, Article VI of the
Code of Ordinances County of New Hanover, North Carolina.

APPENDIX F

POST-CONSTRUCTION SITE RUNOFF CONTROLS

Included in this section:

- Inspection Reporting Summary
- Inspection Letter
- Sample Language And Corrective Actions For Noncompliance Issues
- Stormwater Detention Facility Compliance Inspection Report

2007 BMP Compliance Inspection Summary

Dates of Inspections	June - July	December
Total # sites Inspected	262	266
# Sites Requiring Maintenance	33	27

SAMPLE LETTER

Date

«OWNER»
«CO_OWNER»
«OWN_ADDR»
«OWN_CITY», «OWN_STATE» «OWN_ZIP»

RE: Storm Water Maintenance Inspection - «SUBD_NAME»
(Parcel # «PIN»)

The City of Wilmington Storm Water Services Section has recently completed a routine inspection of the storm water management facilities at «SIT_ADDR» for the above referenced site. The facility was inspected for compliance with the operation and maintenance requirements as outlined in the City's Technical Standards Manual. The City will be conducting these inspections a minimum of twice a year. Our ---------- (date) inspection indicates that the storm water facilities at the above property does not comply with current maintenance standards as listed on the attached Compliance Inspection Report.

According to the storm water management specifications and standards and the inspection and maintenance agreement from the responsible entities, corrective action must be taken within a reasonable time period. The City will be reinspecting the above storm water facilities to track the progress of any corrective action. I will be happy to work with you toward a satisfactory resolution of this matter. If you have questions, please contact me at 341-4694. Your cooperation and assistance in the City's storm water management efforts is greatly appreciated.

Sincerely,

Jim Quinn
Senior Engineering Specialist
Storm Water Services

SAMPLE LANGUAGE AND CORRECTIVE ACTIONS FOR NONCOMPLIANCE ISSUES

Standard Language for Retention Ponds in Non-compliance

1) Erosion around concrete flume
2) Erosion of retention pond slopes
3) Erosion around pond inlet
4) Erosion around outlet structure.
5) Debris (list) in retention pond(s)
6) Debris (list) obstructing outlet structure
7) Debris (list) obstructing flow into pond
8) Debris (vegetation, leaves, etc.) in concrete flume obstructing flow into retention pond
9) Debris (list) in emergency spillway
10) Outlet structure not functioning properly because orifice is blocked
11) Sediment accumulation within inlet pipes to pond
12) Accumulation of soil from erosion channel(s) in pond
13) Insufficient grass ground cover in the swale area(s)
14) Insufficient grass ground cover on retention pond slopes
15) Insufficient grass ground cover in isolated areas along pond slopes
16) Trash rack absent or not secured to outlet structure
17) Trash screen for lower orifice absent
18) Retention pond slopes not properly maintained
19) Retention pond slopes not properly graded
20) Vegetation covering outlet structure or inlet pipes
21) Vegetation in pond has reduced surface area
22) Vegetation obstructing outlet structure
23) Improper construction of outlet structure (list)

Corrective Action for Retention Ponds in Non-Compliance

1) Stabilize slopes by filling in eroded area(s) with compacted soil and establishing non-erosive grass ground cover
2) Stabilize ditch banks
3) Establish non-erosive grass-ground cover on pond slopes
4) Establish non-erosive grass ground cover in swale area(s)
5) Establish non-erosive grass-ground cover in isolated bare areas
6) Remove debris from (list). Monitor monthly
7) Remove vegetation around outlet structure
8) Remove vegetation and debris from pond's inlet pipes
9) Remove excessive sediment or debris from eroded areas in pond
10) Maintain landscaping along periphery of retention pond in order to maintain aesthetic quality of site and prevent a reduction in capacity of the storm water system
11) Maintain grass/groundcover on slopes so as not to exceed a height of 12 inches
12) Anchor trash rack to outlet structure
13) Place screen over lower orifice opening

14) Remove obstruction from lower orifice in order to allow water flow into outlet structure
15) Retention pond slopes must be regraded according to approved construction plans
16) Remove excess vegetation in retention pond. Vegetation should not exceed 1/2 of the surface area of retention pond
17) Make necessary corrections to outlet structure according to approved construction plans
18) Submit “as-built” plan to Stormwater Services Section
19) Selective clearing of woody vegetation is necessary.

209 Coleman Drive
PO Box 1810
Wilmington, NC 28402
Phone: (910) 343-4777
Fax: (910) 341-0099

Storm Water Detention Facility
Compliance Inspection Report

Site: _____ **Watershed:** _____

Date: _____ **Location:** _____

Violations	**Corrective Actions Needed**
Slopes	
☐Erosion of retention pond slopes	_____
☐Erosion around pond inlet	_____
☐Erosion around outlet structure	_____
☐Retention pond slopes not properly maintained	_____
☐Retention pond slopes not properly graded	_____
☐Insufficient grass ground cover in the swale area(s)	_____
Inlets	
☐Obstructed flow into pond due to:	_____
☐Sediment accumulation within pipes	_____
Emergency Spillway	
☐Debris located in spillway	_____
☐Emergency spillway not properly maintained	_____
Outlet Structure	
☐Debris obstructing outlet structure	_____
☐Outlet structure not functioning properly because orifice is blocked	_____
☐Trash rack absent or not secured to outlet structure	_____
☐Trash screen for lower orifice absent	_____
☐Vegetation obstructing outlet structure	_____
Pond Main Body	
☐Vegetative shelf insufficiently planted	_____
☐Vegetative shelf not in compliance	_____
☐Sediment accumulation	_____
☐Floating debris	_____
☐Vegetation in pond has reduced surface area	_____
Other☐	_____
	_____

APPENDIX G

POLLUTION PREVENTION & GOOD HOUSEKEEPING
FOR MUNICIPAL OPERATIONS

Included in this section:

- Employee Trainings

Good Housekeeping/Pollution Prevention Training
December 5, 2007, 8am-10am
Public Services EOC Room – 209 Coleman Drive
Attendees: 19 City Staff members in supervisory positions that conduct operations and maintenance activities on City owned facilities.
Summary: Staff was presented with a brief water quality background. They were then presented with good and bad practices that may occur on operation sites and ways to correct unfavorable practices.

APPENDIX H

THREATENED & ENDANGERED SPECIES (Shortnose Sturgeon)

Included in this section:

- BMP Reporting Table

DATE / TIME	PLACE	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY OR INFO COLLECTED
Create Public Education Program to Increase Awareness of the Shortnose Sturgeon					
10/1/2008	Stormwater office	General public	Stormwater staff	Outreach and education plan developed for the Shortnose Sturgeon	Action plan will serve as guidance for public outreach and education efforts
11/1/2008	Stormwater office	General public	Stormwater staff	Develop public education brochure	Educational Shortnose Sturgeon brochure
11/1/2008	Stormwater office	General public	Stormwater staff	Develop public education bookmark	Educational Shortnose Sturgeon bookmark
12/1/2008	Cape Fear River Watch headquarters	General public	Ryan Glass, NC Aquarium at Fort Fisher	Slide show presentation (CFRW contracted activity)	35 attended presentation to learn about endangered fish in the Cape Fear River
Ongoing	Special events, public meetings	General public	Stormwater staff	Distribute educational brochures and bookmarks at special events and public meetings	Shortnose Sturgeon information and education given to the public

APPENDIX I

REGULATORY & ENFORCEMENT ACTIONS

Included in this section:

- Enforcement Action Reporting Summary
- Enforcement Letters

The Stormwater Ordinance Enforcement Program currently consists of enforcing Wilmington's Code of Ordinance Sec 18-734 which prohibits obstructions and organic yard waste from purposefully being placed into any stormwater conveyance.

In 07-08, the Public Services Department investigated approximately 57 stormwater ordinance violation reports. Reports consisted of improper management of yard waste and pet waste. More serious offenses result in the issuance of a Notice of Violation and applicable fines. When the department receives a complaint it is recorded and activities are documented. The report is investigated and a response to the violation most often includes public education or a letter stating the ordinance violated and the department's expectations on ceasing and correcting the activity.

The Public Services Department has added to its staff a Code Enforcement officer in anticipation of the new Phase II requirements and Stormwater Ordinances regulating illicit discharges that are being drafted at this time.

In addition, the Public Utilities Department enforces the Public Utilities Ordinance Sec 12-83 which prohibits any discharge of any wastewater or other polluted waters to natural outlets. Notice of Violation in the case of discharge to the natural outlets are issued through the Public Utilities Department's Environmental Services Division**.** Illicit discharge complaints historically have been referred to the Public Utilities Department and investigated and included in the POTW's Non-Discharge and Collection reporting requirements.

WILMINGTON
North Carolina

Environmental Services Division
Environmental Compliance Section
(Date)

Certified Mail
Return Receipt Requested

(ADDRESS)

Ref: Oil/Water Separator needs to be rerouted to sanitary sewer and floor drains need to be sealed at (Address).

Dear Mr. (CITIZEN):

Upon reviewing the (Name of Company) Stormwater Pollution Prevention Plan, it has been determined that floor drains located in the main building's maintenance bays discharge to an oil/water separator located on the outside south end of the building. This oil/water separator then discharges to the storm sewer. The oil/water separator needs to be rerouted to the sanitary sewer. Floor drains located in the vehicle maintenance building bays appear to be connected to the storm sewer also and need to be plugged. These types of discharges are prohibited in accordance with City of Wilmington Code of Ordinances section 12-83. Once you have made all necessary repairs you will need to contact our office so that we can verify them.

Within sixty days from the date at the top of this letter, you must make these repairs. Violations of City of Wilmington Code of Ordinances section 12-83 could lead to escalated enforcement, which includes fines and termination of water service. If you have any questions or feel you have received this letter in error feel free to call Allen Baker or me at (910) 343-3910.

Respectfully yours,

Dolores J. Bradshaw
Environmental Compliance Supervisor

Encl: City of Wilmington Code of Ordinance section 12-83

Public Services
Stormwater Services
209 Coleman Drive
PO Box 1810
Wilmington, NC 28402-1810

910 343-4777
910 341-0099 fax
wilmingtonnc.gov
Dial 711 TTY/Voice

(Date)

(Address)

RE: Wilmington City Ordinance, Sec. 18-734

Dear Mr. Landscaper,

A report was made to our department that on April 10, 2008, one of your landscape crews was seen blowing lawn debris into 3rd Street, in front of _____.

I am sure you are aware that this is a violation of the City of Wilmington's Ordinance that states; It is unlawful to place leaves, grass clippings, trash debris of any kind in streams, storm drains, ditches, and streets or to cause an obstruction to any part of the storm drain system. We are obligated to address all reports of this nature and issue civil penalties to ***repeat*** offenders.

Enclosed you will find our educational material stating the ordinance and the requirements, for you to share with your employees. It is our goal to provide the public with the right information in order for them to reduce stormwater pollution and avoid potential fines.

We hope you will take this opportunity to make sure each of your employees is well informed of this regulation and that you will put the proper mechanism in place to ensure your future employees receive this information as well. For more information, you may visit our website at www.wilmingtonnc.gov.

Please help us, and do your part, to protect the surface waters in the Cape Fear River Region. If you have any questions or concerns, please do not hesitate to contact me.

Regards,

Beth Nunnally
Code Enforcement Officer
Public Services Department